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PROCEEDINGS

OF THE

AMERICAN PHARMACEUTICAL ASSOCIATION

AT THE

Twenty-sixth Annual Meeting,

HELD IN ATLANTA, GA., NOVEMBER, 1878.

ALSO THE

CONSTITUTION, BY-LAWS, AND ROLL OF MEMBERS.

PHILADELPHIA:
SHERMAN & CO., PRINTERS.
1879.

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1878-79.

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William Hegeman,	New York,	1859–60
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John M. Maisch,	Philadelphia,	1862–63
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LOCAL SECRETARIES.

Peter Wendover Bedford,	New York,	1866–67
Alfred B. Taylor,	Philadelphia,	1867–68
Henry W. Fuller,	Chicago,	1868–69
J. Faris Moore,	Baltimore,	1869–70
William H. Crawford,	St. Louis, Mo.,	1870–71
Henry C. Gaylord,	Cleveland, O.,	1871–72
Thomas H. Hazard,	Richmond, Va.,	1872–73
Emil Scheffer,	Louisville, Ky.,	1873–84
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Adolphus W. Miller,	Philadelphia,	1875–76
Henry J. Rose,	Toronto, Canada,	1876–77
Jesse W. Rankin,	Atlanta, Ga.,	1877–78
Eli Lilly,	Indianapolis, Ind.,	1878–79

REPORTER ON PROGRESS OF PHARMACY.

C. Lewis Diehl,	Louisville, Ky.,	1873–79

AUTHORIZED AGENTS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

Nominated by the Treasurer and Permanent Secretary, and approved by the President, to carry out the resolution passed at the fifth session of the 18th Annual Meeting.

California,	James G. Steele, 521 Montgomery St.,	San Francisco.
Dist. of Columbia,	John M. Milburn, 1429 Pennsylvania Av.,	Washington.
Delaware,	Z. James Belt, Sixth & Market Sts.,	Wilmington.
Illinois,	Henry W. Fuller, 24 Market St.,	Chicago.
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	Maxwell Abernethy, Newark Ave.,	Jersey City.
New York,	Daniel C. Robbins, 91 Fulton St.,	New York.
	George C. Close, Smith & Schermerhorn,	Brooklyn.
Ohio,	John U. Lloyd, Court & Plum Sts.,	Cincinnati.
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Tennessee,	James S. Robinson, Second & Madison Sts.,	Memphis.
	John C. Wharton, 38 Union St,	Nashville.
Virginia,	T. Roberts Baker, 909 Main St.,	Richmond.

AMENDMENT TO THE CONSTITUTION.

To be acted on at the Twenty-seventh Annual Meeting.

Proposed by Mr. Joseph P. Remington at the fifth session of the Twenty-fifth Meeting.

Strike out in third line of Article I the words "the United States," and insert in place thereof "America," so as to make the sentence read as follows:

"Its aim shall be to unite the educated and reputable Pharmaceutists and Druggists of *America* in the following objects."

AMENDMENT TO THE BY-LAWS.

Proposed by Committee of Ways and Means at the fourth session, 1878, and by vote of the Association at the fifth session made the special business of the third session of the Twenty-seventh Annual Meeting.

Resolved, That Article V, Chapter VII, of the By-laws be amended to read: Any member not in arrears to the Association, who shall pay to the Treasurer the sum of $75 during the first year of his connection therewith, or after five years $70, or after ten years $60, or after fifteen years $50, or after twenty years $40, shall become a life member and shall be exempt from all future annual contributions.

Resolved, That at each annual session the Auditing Committee shall, if necessary, determine a per capita tax to cover estimated deficiencies for the fiscal year, to be levied and collected with the yearly contribution.

Resolved, That the Secretary shall notify life members of the publication of each year's Proceedings, and furnish the same to such upon their subsequent application.

LIST OF QUERIES

TO BE ANSWERED AT THE TWENTY-SEVENTH ANNUAL MEETING, IN 1879, AT INDIANAPOLIS, INDIANA.

QUERY 1. The Resin of Leptandra Virginica (the Leptandrin of commerce) varies much in appearance and sensible properties. To what causes are these varying results to be attributed? What is the best process for the preparation of the resin and what is the average yield of the root?

Accepted by J. U. Lloyd, Cincinnati, Ohio.

2. An essay on Gelsemium Sempervirens, embracing the question as to what principle its activity is due, and whether the green root possesses any advantage over the dry?

Accepted by Gust. J. Luhn, Charleston, S. C.

3. Nearly all the Lactic Acid in use in this country is manufactured abroad. Cannot this acid be made as well and as cheaply in this country? Give a formula for its preparation.

Accepted by P. J. Schumann, Atlanta, Ga.

4. Eriodictyon Californicum is receiving attention for its action in lung diseases and bronchial affections. What is its therapeutical value and to what is its activity due? Make a chemical examination of it.

Accepted by Charles Mohr, Mobile, Ala.

5. Does Erigeron Canadense possess any medicinal properties after the volatile oil has been removed from it by distillation or by treatment with Petroleum Benzin?

Accepted by F. Marion Murray, Philadelphia, Pa.

6. Are the medicinal qualities of Cannabis Americana such as to warrant its place in the primary list of the United States Pharmacopœia?

Accepted by H. P. Tarrant, Augusta, Ga.

7. What is the therapeutic value of Ergot from Corn?

Accepted by Norman J. Kuhn, Salem, Ohio.

8. What is the source of supply of Spigelia? Does it come from the Spigelia Marilandica or from other plants?

Accepted by R. H. Land, Augusta, Ga.

9. An examination of the residuum liquid from Hydrastis Canadensis, from which Berberia has been separated, with a view to establish the identity of the acid with which the alkaloids are naturally combined.

Accepted by Emil L. Boerner, Iowa City, Iowa.

10. Should not the fluid extract and syrup of Seneka be prepared with an alkaline menstruum?

Accepted by George W. Kennedy, Pottsville, Pa.

11. Desired the best excipient for pills, bearing in mind the necessity for a permanently soft, pliable mass and solubility in the stomach.

Accepted by F. Marion Murray, Philadelphia, Pa.

12. Aromatic Spirit of Ammonia has been proposed as a menstruum for exhausting lupulin. Has this any advantage over alcohol?

Accepted by C. T. George, Harrisburg, Pa.

13. On dissolving solids in water or in other liquids, a change of bulk is generally produced, consisting in nearly every case of an increase of volume. It is desired to work out a table of the changes of bulk produced by dissolving definite quantities of officinal solids in definite quantities of menstrua.

Accepted by P. C. Candidus, Mobile, Ala.

14. What is the best process for preparing powdered extracts? Report on the feasibility of preparing them of a definite strength by evaporating the fluid extracts on milk-sugar. Give practical working formulas.

Accepted by C. T. George, Harrisburg, Pa.

15. Can any of the decoctions or infusions of the United States Pharmacopœia be satisfactorily prepared from the fluid extracts of the United States Pharmacopœia, and in what particulars do they differ from infusions and decoctions prepared in the prescribed manner?

Accepted by William Saunders, London, Ont.

16. Would the substitution of Citrate of Sodium for Citrate of Ammonium in the officinal Pyrophosphate of Iron make the latter less liable to become insoluble on keeping?

Continued to G. F. H. Markoe, Boston, Mass.

17. Are there any drugs now successfully cultivated here which were formerly obtained from foreign countries?

Continued to H. S. Wellcome, New York.

18. What is Oil of Cedar of commerce? Where and from what plant or plants is it made, and what is it used for?

Continued to J. H. Stein, Reading, Pa.

19. An essay on the conditions necessary to successfully conduct percolation.

Continued to J. U. Lloyd, Cincinnati, O.

20. How do Rio and East India Tapioca compare in dietetic value?

Continued to William J. Jenks, Philadelphia, Pa.

21. The preservative properties of Boracic, Benzoic and Salicylic Acids

have lately attracted considerable attention. What are their respective values as preservatives, and which is best adapted to the uses of the pharmacist? If possible give a ready method for their use.

Continued to S. P. Sharples, Boston, Mass.

22. What are the comparative values of Benzoin and Styrax for preserving ointments, etc., from rancidity and decomposition?

Continued to I. J. Grahame, Philadelphia, Pa.

23. To what extent do the pills of the United States Pharmacopœia supply the demand for ready-made pills? Are there any formulas which, if introduced, would add to the value of the list?

Continued to R. V. Mattison, Philadelphia, Pa.

24. The affinity of Glycerin for water is well known; to what extent will officinal Glycerin attract moisture on being exposed to a damp atmosphere?

Continued to George W. Kennedy, Pottsville, Pa.

25. Tinctures. Experiments and suggestions in regard to proportion of drug and strength of alcohol necessary to extraction and preservation.

Continued to Jacob Jesson, Chippewa Falls, Wis.

26. There is a counter-irritant or a revulsive plaster spread upon linen or cotton cloth purporting to be made in Paris, France, under the name of "Emplastrum Thapsiæ." As this has decided therapeutic value, what is its composition, and can it be advantageously prepared and kept for extemporaneous use?

Continued to H. P. Tarrant, Augusta, Ga.

27. Can Grape-sugar or Glucose be substituted for Cane-sugar, Honey, and Glycerin, in pharmaceutical preparations? Give a practical essay on the subject.

Continued to E. H. Sargent, Chicago, Ill.

28. The quantity of Acetic Acid in the formula for the preparation of Acetic Extract of Colchicum (U. S. P., 1870), is directed to be four fluid ounces for twelve troy ounces of drug. Is not this quantity unnecessarily large, and cannot less be used without interfering with the stability of the preparation? Also, can the formula be altered in regard to its menstruum by using alcohol with any advantage?

Continued to I. J. Grahame, Philadelphia, Pa.

29. On the condition of the mercurial constituent in the several pulverulent preparations as recommended to be prepared with Sugar of Milk? (See Am. Journ. Pharm., 1876, p. 267.)

Continued to P. W. Bedford, New York.

30. Solvents for Wax, Paraffin, Stearin, Cresin, as a test for adulteration of wax.

Continued to P. W. Bedford, New York.

31. Report on brands of White Wax in market.

Continued to P W. Bedford, New York.

32. An Essay on the use of Citric Acid and other preservative agents in Syrup of Iodide of Iron.

Continued to P. W. Bedford, New York.

33. Can Salicin be economically made in North America, and by what process?

Continued to E. Gregory, Lindsay, Ont.

34 What is the therapeutic value of Dialyzed Iron as an antidote for Arsenious Acid, as compared with the Hydrated Ferric Oxide?

Continued to Adolph Tscheppe, New York.

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PREFATORY NOTICE.

THE necessity of postponing the Twenty-sixth Annual Meeting to the latter part of November has very materially interfered with the prompt publication of the Proceedings. The very full report on the Progress of Pharmacy was complete in the hands of the Secretary in the beginning of September, and upon his recommendation the officers and the chairman of the Executive Committee agreed in the opinion and gave their consent to the printing of this report in advance of the meeting. If this intention could have then been carried out, the volume would have been in the hands of the members early in February. However, unexpected difficulties arose, which could not be adjusted until the latter part of December, whereby the publication was necessarily delayed for about four months. Difficulties of the same nature, it is believed, will not hereafter occur, so that in the future the publication of the Annual Proceedings may be expected early in the year, even if the Association should hereafter hold its annual meeting late instead of early in autumn.

The portrait of Ferris Bringhurst, which embellishes this number of the Proceedings, is an excellent and truthful likeness of our late fellow-member, whose sudden death, in the prime of life, closed the earthly career of one of the purest and best men in the whole circle of American pharmacists. He was a graduate of the Philadelphia College of Pharmacy, Class 1857, and Vice-President of its Alumni Association. He became a member of the American Pharmaceutical Association in 1862, and was actively interested in its welfare. Elected Vice-President in 1868, he was called to preside over the Chicago meeting. In his native city of Wilmington, Delaware, he occupied a prominent position. He was the founder and President of the Wilmington Fountain Society, and President of the Young Men's Free Reading Room Association, and was deeply interested in promoting the instruction and elevation of the "working people," of his native city.

The Wilmington Fountain Society, in token of their love and esteem, have erected a memorial fountain, at the intersection of two of the prominent thoroughfares, bearing the following inscription:

To the Memory of
FERRIS BRINGHURST,
First President of the
WILMINGTON FOUNTAIN SOCIETY.

He was honored and respected by all who knew him, his kindness of heart and genial spirit endearing him to a large circle of friends. Truly it may be said that his was a well-rounded Christian life. (A brief obituary notice will be found in the Proceedings for 1871, page 38.)

Most of the woodcuts contained in the present volume have been kindly loaned by the publishers of "New Remedies," others by the publishers of the "American Journal of Pharmacy," and those illustrating Dr. Squibb's paper were obligingly furnished by him.

The undersigned desire to direct the attention of the members to the report on the Centennial Fund, on page 876 of the present volume, and to urge upon all the desirability of promptly aiding in securing it for the Association. While a few members have contributed liberally towards it, it is obvious that a small sum paid by each member would raise the amount considerably beyond that required, and thus secure to the Association the means of aiding to a certain extent original investigations, which, in turn, would result to the benefit of the profession.

We would also earnestly request members to carefully read and consider the report of the Committee on Ways and Means, on page 888, and the discussion had thereon, pages 910 to 914. The same subject has occupied much of the time of the Association during previous meetings since 1860, without having reached a result by which the Association would be permanently relieved from embarrassment. It is believed that if each member who intends being present at the Twenty-seventh Annual Meeting, would familiarize himself with all the facts as they have been brought forward in the various reports and discussions, the subject which has been specially assigned for consideration at the third session of the next meeting could be satisfactorily disposed of in a short time.

Blanks for application of membership will be furnished upon application to either of the undersigned, and after they have been duly signed should reach the Chairman of the Executive Committee, if possible, at least one week before the meeting.

All errors and inaccuracies in the Roll of Members and changes of address should be promptly communicated to the Secretary.

The prices of Proceedings now on hand, *including postage*, have been fixed as follows:

1851, 1852, 1853, 1854, 1855,	unbound,	$0.25	each		
1857,	"	0.50	"	bound,	$0 80
1858, 1859,	"	1.50	"	"	1.75
1860,				"	1.25
1862, 1863,				"	1.50
1864, 1865, 1866,	"	1.50	"	"	1.80
1867,	"	2.20	"	"	2.50
1868, 1869, 1870,	"	2.50	"	"	3.00
1871,	"	4.50	"	"	5.25
1872,	"	2.50	"	"	3.00
1873, 1874,	"	5.00	"	"	5.50
1875, 1876,	"	7.00	"	"	7.50
1877,	"	6 00	"	"	6.50
1878,	"	7.00	"	"	7.50

There were no Proceedings published in 1861, and those for 1856 are entirely out of print.

The entire set of bound volumes, the first six in paper covers, will be furnished at $55, and the set of unbound volumes, including the bound ones for 1860, 1862, and 1863, at $50. To enable the members who have recently joined the Association to complete their sets, the committee offer the volumes for 1872 and all the preceding years bound at $20, and unbound at $18. These prices for sets are *exclusive* of postage or express charges.

The Twenty-seventh Annual Meeting will be held in the city of Indianapolis, Ind., on the second Tuesday (ninth day) of September, 1879, at three o'clock P.M. Delegations to that meeting are requested to make use of the blank forms of credentials, which may be obtained from the Secretary, and to furnish the Secretary with the names and address of the President and Secretary of the society which they may represent, as required according to the report published on page 907, which has been adopted by the Association.

GEORGE W. KENNEDY,
Chairman of the Executive Committee, Pottsville, Pa.

JOHN M. MAISCH,
Permanent Secretary, No. 145 North Tenth Street, Philadelphia, Pa.

List of Members

IN ATTENDANCE AT THE TWENTY-SIXTH ANNUAL MEETING

Avary, Archibald, Atlanta, Ga.
Bradfield, L. H., Atlanta, Ga.
Brumby, R. T., Athens, Ga.
Brunner, N. J., Macon, Ga.
Candidus, P. C., Mobile, Ala.
Candler, Asa Y., Atlanta, Ga.
Cook, Thomas P., Philadelphia, Pa.
Drake, Robert S., St. Louis, Mo.
Eastman, Charles S., Concord, N H.
Ellis, William L. A., Hawkinsville, Ga
George, Charles T., Harrisburg, Pa.
Green, Charles H., Atlanta, Ga.
Griffith, Hiram E., Niagara Falls, N. Y.
Grove, John E., Philadelphia, Pa.
Hancock, C. W., Philadelphia, Pa.
Howarth, J. L., Atlanta, Ga.
Hughes, B. L., Jacksonville, Fla.
Hunt, L. W., Macon, Ga.
Ingalls, John, Macon, Ga.
Kennedy, George W., Pottsville, Pa.
Kuhn, Norman F., Salem, O.
Land, R. H., Augusta, Ga.
Lemberger, Joseph L., Lebanon, Pa.
Lindeman, Herm. E., Austin, Texas.
Lloyd, J. U., Cincinnati, O.
Luhn, G. J., Charleston, S. C.
McKenney, Jesse F., Shelbyville, Ky.
Maisch, John M., Philadelphia, Pa.
Massenburg, T. L., Macon, Ga.
Menard, A. A., Macon, Ga.
Menninger, H. J., Brooklyn, N. Y.
Moise, B. F., Charleston, S. C.
Morgan, Y. H., Cochran, Ga.
Murray, F. Marion, Philadelphia, Pa.
Patterson, J. L., Philadelphia, Pa.
Peacock, F. S., Atlanta, Ga.
Pinson, John L., Atlanta, Ga.
Rankin, Jesse W., Atlanta, Ga.
Reynolds, John J., Atlanta, Ga.
Richardson, J. H., Chicago, Ill.
Robbins, Alonzo, Philadelphia, Pa.
Rose, Henry J., Toronto, Can.
Ross, George J., Lebanon, Pa.
Russell, E. S., Nashua, N. H.
Saunders, William, London, Can.
Schaffle, S. W. W., Lewisburg, Pa.
Scheffer, E., Louisville, Ky.
Schumann, P. J., Atlanta, Ga.
Schumann, Theodore, Atlanta, Ga.

Shinn, James T., Philadelphia, Pa.
Sloan, George W., Indianapolis, Ind.
Smith, O. L., Augusta, Ga.
Stanford, J. W., Cuthbert, Ga.
Tarrant, H. P., Augusta, Ga.
Taylor, Walter A., Atlanta, Ga.
Tomfohrde, J. W., St. Louis, Mo.
Tufts, Charles A., Dover, N. H.
Turnley, P. L., Rome, Ga.
Whiting, F. T., Great Barrington, Mass.
Wood, A. F., New Haven, Conn.

PROCEEDINGS

OF THE

TWENTY-SIXTH ANNUAL MEETING

OF THE

American Pharmaceutical Association.

REPORT ON THE PROGRESS OF PHARMACY,

FROM JULY 1, 1877, TO JUNE 30, 1878.

BY C. LEWIS DIEHL.

The twelve months embraced by this report have been characterized by the usual activity in research on subjects related to pharmacy. The results in many instances are of the highest importance, either in the aspect of new discoveries, or in their relation to previously-ascertained facts. Leisure, provided by the general depression of business, close application, and, perhaps, further experience, have enabled a more thorough extraction of the papers presented—and of a larger number of them—than has been hitherto possible.

The "Progress of Pharmacy," as far as the United States are concerned, may perhaps be best considered under two heads:

1. The progress that is secured by research, and by the furtherance of educational facilities; and 2. The progress that is made by the discouragement of empiricism and the establishment of a proper ethical and professional standard.

Regarding the first, the progress during the past year may be regarded as perfectly satisfactory. The papers contributed to the American journals are in many instances quite valuable, compare well with those contributed to foreign journals, and are specially noted for their practical character; the colleges of pharmacy appear all to be in a flourishing condition, and many have increased their curriculum; while several new local pharmaceutical associations have been organized during the past twelve months, and promise future usefulness.

Pharmaceutic progress, as embraced under the second head, however, is not so satisfactory. The relations of pharmacists to the public, to each other, and to physicians, leave much to be desired, and instead of being progressive, appear rather to tend in the opposite direction. The demand of the public for cheap goods, the variety demanded, competition, the profuse supply of "ready-made" pharmaceuticals, and the disposition of physicians to prescribe medicines of questionable composition or proprietary character, all have a tendency to reduce pharmacists to the condition of mere tradesmen, and to discourage those having higher aims. Just how far pharmacists are responsible for this condition of things, it is difficult to decide. To decide to what extent physicians should be criticized for prescribing medicines of a proprietary or semi-proprietary character, is perhaps equally difficult. But there certainly seems to be a way to ameliorate this condition, and that is to provide in our next Pharmacopœia for a class of preparations, which, notwithstanding their current use prior to the last revision of the Pharmacopœia, were utterly ignored by the framers of the present standard; and it is in this direction that the Committee on the Revision of the Pharmacopœia, appointed at our last annual meeting, can do some good work.

This committee organized shortly after its appointment and will doubtless report some valuable progress at the present meeting. At its invitation, our fellow-member, Dr. E. R. Squibb, has communicated a very valuable paper on re-percolation as applied to fluid extracts. The method is one which Dr. Squibb has for years applied to the preparation of fluid extracts in his own laboratory, and has described and referred to in papers to the Association at various times. As a member of the committee, the author of this report has also written a paper detailing a scheme for coöperative experiments on fluid extracts. A number of members have consented to make experiments in accordance with this scheme, and will probably communicate their results at this meeting. Some experiments on the fluid extract of cimicifuga, by Mr. J. U. Lloyd, and on the fluid extract of jaborandi, by Dr. F. V. Greene, likewise contain interesting suggestions relative to percolation. A novel process for preparing solid extracts is proposed by Professor Herrera. It consists in subjecting vegetable juices, or infusions, to partial freezing in an ordinary ice-cream freezer; the frozen portion, which is pure water, is removed by expression, and the remaining liquid is thereby concentrated. This process of partial freezing and expression is repeated until the liquid finally attains a sufficient degree of concentration, when it is further concentrated to the consistence of an extract by exposure in shallow vessels to a current of warm air. The process, of course, is admirably adapted to the preparation of concentrated juices. It is claimed that extracts prepared in this way retain the constituents of the juice, or infusion, in a perfectly unchanged condition. In connection with the subject of fluid and solid extracts, some improved forms of pharmaceutic stills, condensers, percolating-stands, by Lenz, Rice, Remington, and others, may be mentioned.

Dialysed iron has elicited quite a number of interesting papers. The erroneous impression, that this preparation was a solution of pure ferric oxide, containing no chlorine, which prevailed when the preparation was first introduced, has been corrected by several papers, which show, not only that the preparation contains chlorine as a necessary constituent, but also that its reaction is only masked by reason of the dense color of the solution. Various methods for its preparation, differing mainly in the manipulation, are given. One method, however, that of solution without resorting to dialysis, deserves more than passing mention. Some years ago, Dr. Herrmann Hager had suggested that a solution corresponding to the dialysed iron of Dr. Wagner, the originator, may be obtained by simply adding solution of ferric chloride to well-washed magma of ferric oxide, and allowing the mixture to stand, with occasional agitation, until, after eight to fourteen days, a solution was formed. This quantity of ferric chloride, though relatively small, is nevertheless much larger than that which is found in well-prepared dialysed iron. Experiments now made by Prof. E. Scheffer, have shown that it is quite possible to obtain a ferric liquid, by simple solution, that is nearly, if not quite as free from chlorine as the best commercial forms of dialysed iron, and that the ordinary dialysed irons of commerce exceed it in the quantity of chlorine they contain. He had observed the important fact, that if dilute solution of ferric chloride is treated with dilute caustic ammonia until a further addition occasions a permanent precipitate, a further addition of 2 per cent. of the quantity of ammonia originally consumed will cause the complete precipitation of the ferric oxide, and the supernatant liquid retains acid reaction. The precipitated ferric oxide retains chlorine, the quantity of which is decreased, in proportion as more than 2 per cent. of ammonia has been added, until, finally, if the quantity added was sufficient to render the supernatant liquid alkaline, the precipitate contains no chlorine, but instead, ammonia. If the ferric oxides obtained under these several conditions are washed by decantation, in the instance of those containing chlorine, a period will arrive when the precipitate will settle slowly, and if then transferred to a filter and the washing is continued for a short time, the magma will assume a gelatinous or semi-liquid, nearly black condition, according to whether the quantity of chlorine retained is greater or less, and a concentrated clear solution is finally formed. With the magmas, however, that contain ammonia in place of chlorine, no such effect is observed, and they will not dissolve. Although these experiments and observations are still incomplete, they appear to point out a method whereby, in the near future, a solution of ferric oxide, corresponding to the best forms of dialysed iron, may readily and conveniently be obtained. In connection with the subject of dialysed iron, some opportune remarks on dialysis, by Mr. C. Rice and Mr. R. V. Mattison, are also made.

A new form of iron solution is the albuminate of iron recommended by Dr. Friese. It is obtained by adding egg albumen to solution of ferric chloride, washing the precipitate thoroughly with water, and digesting it in water which has been slightly acidulated with hydrochloric acid, when, after several days, complete solution will be effected. Various modifications and improvements of Dr. Friese's method have already been suggested, and among them, that of Mr. E. Merk, recommending the preparation of dry albuminate of iron, from which the solution, being unstable, may be prepared as wanted, deserves special mention. Dr. Choisnard recommends the new compound as being more readily absorbed than other ferruginous preparations, and states that it was first introduced by Lassaigne under the name of albuminate of iron and potassium.

The emulsification of oils has drawn out several papers during the year. It is the experience of pharmacists who have to prepare this class of mixtures frequently—notably the German—that the proportion of oil, gum, and water, must be definite to secure uniformly and rapidly a good emulsion; such being subsequently diluted if necessary. L. v. Cotzhausen recognizes this fact, and has contributed an interesting paper. It would be well for the Pharmacopœia Committee to take this subject under advisement. Suitable formulas for medicinal soaps might also be framed in view of the fact that commercial soaps are so variable in their quality and composition. Several papers have been contributed on this subject.

Prof. W. Dymock, of Bombay, has continued his "Notes on Indian Drugs," which, as published previously, were extracted for last year's report. A concise extract of those that have appeared since has been made for this, and will be found interesting for reference. Interesting papers on Maltese drugs, by Mr. Robert Watson; on Liberian medicinal plants, by Mr. E. M. Holmes, and on some Abyssinian drugs, by Professor Flückiger, have also been extracted. The investigations on the active constituents of Ergot have been continued, by Professor Dragendorff and Podwissotzki on the one hand, and by Tanret on the other. It will be remembered that the first-mentioned gentleman determined an amorphous acid substance—sclerotic acid—to be the chief active constituent of Ergot, while Tanret maintains that its activity is chiefly due to a new alkaloid, which he has named ergotinia. The present papers of the respective authors give a nearer description of the substances isolated by them, as well as improved methods for their preparation, and some new reactions discovered since the date of their previous communications. Formulas are given by P. Carles for the preparation of Bonjean's ergotin, and by Yvon for a fluid extract of ergot suitable for hypodermic injection, both of which merit attention. The rare occurrence of Aspidium filix mas on this Continent, and the comparatively frequent occurrence of the indigenous species of Aspidium—A. marginale—make experiments in the direction of the tænifuge value of the latter very acceptable. Mr. Charles H. Cressler has prepared the oleo-resin from the rhizome of the American fern, and physiological experiments made with it, prove it to have tænifuge properties which are in all probability equal to those of the male fern. It has been asserted that the active principle of colchicum seed is chiefly contained in the outer integument of the seed; an assertion which is completely contradicted by the experiments of Nathan Rosenwasser. By the appropriate treatment of a quantity of the unbroken seeds, he obtained five grains of colchicia, and after crushing the same seeds, he obtained eleven grains more. Interesting experiments on colchicum root have been made by Theodore F. Beckert. The commercial root is often very variable in appearance, portions being very much darker than others, some almost black. His experiments prove that the color is not necessarily indicative of deficiency in alkaloid, but that age very materially affects the quantity of that constituent; very old roots having been found to contain considerably less than roots of recent importation. The root of another Melanthacea, Chamælirium luteum, more familiarly known as Helonias dioica, has been subjected to investigation by Dr. F. V. Greene ,who obtained from it an amorphous white glucoside, probably allied to saponin, which he has named chamælirin. The bulbous root of the daffodil, Narcissus pseudonarcissus, has yielded to A. W. Gerrard a neutral crystalline principle, and an amorphous alkaloid. The plant has the popular reputation of being poisonous, and physiological experiments made with the new alkaloid—pseudonarcissia—show it to be very active, though apparently not the sole active constituent, since the extract is in some respects more powerful than the alkaloid. The expulsion of saffron from the officinal list of remedial agents, has met with much objection on the part of many pharmacists and physicians, who continue to regard it a valuable agent for the treatment of disease. To this class belongs Dr. A. Patze, who has written an interesting plea for the reëstablishment of saffron to favor. W. W. Stoddart has discovered a very delicate reaction for its coloring matter. It consists in acidifying an infusion of saffron with hydrochloric acid and then dropping into the liquid a crystal of sugar, when a beautiful and characteristic red fluorescence will at once appear. The reaction is available in infusions containing one part of the stigmas in 23,000 parts.

The successful raising in Europe, by Prof. Baillon, of some rhubarb stalks, sent to Prof. Soubeiran from China, by M. Dabry, was announced in 1872, with much *eclat*, because there seemed great probability that the species of rhubarb was that which yielded the true Russian rhubarb of commerce. The species was accordingly named by Prof. Baillon, Rheum officinale. Shortly after this announcement, however, a Russian officer, Lieutenant Przewalski, who had travelled extensively in Northwestern China during the years 1872 and 1873, secured specimens of the plant which, beyond a doubt, yields the true Russian rhubarb, and which turned out to be a hairy variety of Rheum palmatum. Both plants have now been successfully raised in Great Britain: Przewalski's plant, R. palmatum, var. Tanguticum, by Prof. Balfour, of Edinburgh; and Dabry's plant, R. officinale, Baillon, by Mr. Usher, of Banbury. Prof. Balfour describes his plant as corresponding to the specimens of R. palmatum, hitherto cultivated in the Botanic Garden at Edinburgh, with this difference, that the leaves are covered with longish and stiff hairs. H. Werner, who has given the subject considerable attention, expresses the firm opinion that the rhubarb collected in Northern Thibet is obtained exclusively from R. palmatum, L., but admits the probability that the rhubarb collected in the more southern country may be that of R. officinale, Baill. Mr. E. M. Holmes has examined the root of Mr. Usher's plant, (R. officinale, Baill.), and arrives at the conclusion that the Russian root is produced by a plant of much less rapid growth than the R. officinale, Baill. Portions of this same root were subjected to comparative proximate examination with the root of R. rhaponticum (English rhubarb) by Mr. Harold Senier, with results that seem to point to decided superiority of the former over the English plant. The vexed question as to the true source of commercial rhubarb is, therefore, by no means definitely settled, although it is, perhaps, nearer to solution than it has been previous to the present controversy. A variety of rhubarb, indigenous to Java, is described by Prof. Husemann, who believes it to be quite valuable. It grows at an elevation of two thousand to four thousand feet, and the drug appears to be found in three commercial varieties, consisting respectively of the top, middle and bottom portions of the root. Of these the middle portion is valued most, and is the most carefully prepared, while the upper part is valued least. Analysis shows the Java rhubarb to be less astringent and to contain less chrysophanic acid than Chinese rhubarb, but to be richer in chrysophan and emodin. Comparative analyses of Chinese and English rhubarbs have also been made by Prof. Dragendorff.

An Australian solanacea, Duboisia myoporoides, bids fair to become an important addition to the list of therapeutic agents. An extract of the leaves has been found to possess all the properties of Belladonna. It has been imported into England, and at the suggestion of Mr. Holmes, who draws attention to the plant, has been subjected to chemical examination by Mr. A. W. Gerrard, who has isolated an alkaloid, which, while differing from atropia in some of its chemical characters, appears to be identical with it in its physiological action. Mr. A. Pettit, who has also prepared the Duboisia alkaloid, has obtained results which are confirmatory of those of Mr. Gerrard. Another solanacea, Solanum paniculatum, L., is brought forward by Dr. F. V. Greene. The plant is known in Brazil by the name of jurubeba, juripeba, jupeba and jubeba, and the berries there have medicinal reputation and application. Dr. Greene has made some preliminary experiments upon the berries, the supply of which was limited, and has obtained a substance which corresponds in its character to the alkaloids, but could not be subjected to nearer examination as regards its chemical and physiological characters.

Under the name of "Hoang-nan," a bark is recommended by the missionaries of Tong-king, as an excellent remedy in mania and leprosy. This bark has been identified to be false Angustura bark, or, more properly, the bark of Strychnos nux vomica. Regarding false Angustura bark, the question has been raised whether it contained strychnia. W. A. Shenstone has made a series of experiments, which prove that the bark does contain strychnia, although only in small quantity. It is the failure of Pelletier and Caventou to extract strychnia that has doubtless caused Watts and other authorities to state its absence in false Angustura bark. An interesting paper on the sources and preparation of Curare, recently so prominently mentioned as a remedy for hydrophobia, has been contributed by Mr. I. Moss. The highly poisonous character of this substance induces Mr. Moss to caution very earnestly against its careless handling. It is, as is well-known, used by South American Indians as an arrow poison, and is known to be very effective. It should, therefore, never be allowed to come in contact with a fresh cut or scratch. Two good rules would be, never to powder it in a dry condition, and never to touch it with the naked fingers. Dr. Jobert also gives a description of the method of preparation pursued by the Tecuna Indians, in Brazil, and enumerates the plants that are employed in its composition, among which a climbing species of Strychnos is prominently mentioned. W. A. Shenstone's experiments, referred to in last year's report, have rendered it probable that the strychnia, believed by Sonnenschein to be the product of the action of nitric acid upon brucia, is due to the presence of that body ready formed, as impurity. Recent experiments prove to Mr. Shenstone that commercial brucia invariably contains strychnia. He has, furthermore, improved the method formerly recommended by him for the purification of brucia. Prof. Dragendorff and Mr. David Lindo draw attention to some new color reactions of brucia, and Mr. Alf. H. Allen communicates a new method for the detection of strychnia. The bark of another apocynaceous plant, Geissosperma læve, Baill., known by the name of "Pao-Pereira," is known to contain an alkaloid, which Santos, its discoverer, has named pereiria. This alkaloidal principle has now also been isolated from the leaves of the plant by M. M. Rochefontaine and De Freitas. Prof. Baillon is of the opinion that the alkaloid is more properly named Geissospermina. Referring to this Dr. Otto Hesse mentions the fact that he has been engaged in the investigation of the chemical constituents of Pao-Pereira for some time, and that he has determined the existence of several alkaloids in this bark, among which is one soluble in ether, while the others are not. He proposes for this the name of Geissospermina, and gives a description of it, as well as of one of the other alkaloids extracted by him.

The chemistry of Lobelia has been the subject of extensive investigation by M. H. D. Lewis. He finds that the alkaloid, lobelina, exists in the herb in the form of a lobeliate. Lobelic acid, which the late Professor Procter believed to be gallic acid, is described, and the method whereby it was obtained given. The acrid principle of Enders, lobelacrin, is believed to be simply lobeliate of lobelina, with probably an excess of acid. A volatile constituent could not be isolated, and water distilled from the herb possessed no acridity and but little odor. Reinsch's lobeliin he considers a very indefinite substance, probably containing traces of lobelina and lobelic acid. Other constituents, gum, gluten, and resin, were isolated, but not considered important enough for a nearer examination. Mr. Lewis's results must be considered an interesting contribution to the chemistry of this drug. Regarding the reputed medicinal activity of lobelia root, Dr. Chas. A. Plumb maintains that it is quite inert, and states that it is never found in the market; the herb has not the cathartic properties sometimes attributed to it, nor can it be ranked as a poison, though decided emetic activity can not be denied.

The various reports and papers relating to the progress in cinchona cultivation present, as usual, highly interesting information. Mr. D. Howard had, in 1875, called attention to the constant presence of quinidia in renewed bark of C. succirubra and C. officinalis, and in the root-bark of the latter, cultivated in British India. Since then he has had many opportunities to confirm this observation, and he has found the observation to be true also for recent importations of the root-bark of C. succirubra, C. Ledgeriana, and C. Haskarliana, from Java. In the root-barks from Darjeeling, which are remarkable for their high percentages of total alkaloids, being as 8 to 5 in the stem-bark of the same trees, those of C. succirubra show a great increase in the dextrogyrate alkaloids, quinidia and cinchonia; and the root-barks from the Java cinchonas mentioned show a similar tendency, and are in all cases richer in total alkaloids than the stem-bark from the same source. Mr. C. H. Ward reviews the progress of cinchona cultivation in Bengal since the first attempt in 1861. There are at present about three million cinchona plants growing in the Rungbee Valley, near Darjeeling, four-fifths being C. succirubra, which has proved the most successful species on these plantations. He also draws attention to the greater alkaloidal strength of the root-bark, and remarks "that the quantity gradually decreases as we go up the stem." The average yield of the stem-bark, actually harvested, is found to be 4 to 5 per cent. of total alkaloids, the composition of which may be represented by 16.31 quinia, 30.53 cinchonidia, 35.26 cinchonia, and 17.90 amorphous alkaloids, while bark taken from the lower parts of the stem of the finest trees, each year, from 1866 to 1872, yielded from 6 to 7.7 per cent. of total alkaloids. The most valuable cultivated variety of cinchona, however, appears to be C. Ledgeriana, which, in Java, appears to occupy the same position as C. succirubra does in British India. An historical account of the Ledgeriana variety of C. calisaya is given in a recent editorial in "Ph. Jour. and Trans.," and has already been given in previous Reports on the Progress of Pharmacy. The bark yielded by this variety is not only valuable on account of the large yield of total alkaloids, but also, and particularly, because it mainly yields quinia, the present yields being, according to Moens, 6 to 9 or 10, and even 13 per cent. of that alkaloid. Dr. C. Haskarl, in his report on the Cinchona cultivation in Java, 1877, draws attention, however, to a peculiar disease to which the cinchona trees are subject, and he traces this to the presence of an insect, the Heliopeltis theïvora. It is remarkable that this insect does not affect indigenous plants; the only plants affected being such as have been introduced into Java, and among these notably the tea plant. Another variety of cinchona, and one that is probably better suited to the conditions of soil and climate in British India than is the variety Ledgeriana, is the so-called C. pubescens, Howard, a name to which Howard, however, objects, since it is only a hairy variety of C. officinalis, and should, therefore, be called C. officinalis, var pubescens. Prof. DeVrij has recently again drawn attention to this variety, in which the late Mr. McIvor was very much interested. He found a sample of the bark—the last sent to him by Mr. McIvor from the Indian plantations—to contain 9.47 per cent. of total alkaloids, of which 5.728 per cent. (7.637 per cent. crystallized sulphate) was quinia. The unfortunate death of Mr. McIvor has prevented further experiments from being made with this important variety, but it is to be hoped that the paper of Dr. DeVrij, and that of Mr. Howard giving a further account of the plant, will encourage renewed experiments. Reports from Ceylon, where C. succirubra is chiefly planted, are very encouraging. The plant may be found growing luxuriantly everywhere throughout the island, and Mr. Macmillan ventures the opinion that in a very short time Ceylon will rival either or all of the Continental Presidencies in the production of valuable bark.

The confusion existing in the nomenclature of the cinchona alkaloids, which is specially marked in regard to quinidia and cinchonidia, has hitherto been a serious drawback to the study of their characters. Dr. O. Hesse had, in 1873, communicated an extensive review of them, and he has now contributed a second and more complete paper, which, while it does not perhaps completely remove the difficulty, will be found of great service in identifying and establishing the characteristics of the individual cinchona alkaloids. A valuable method for the distinction between the alkaloids, quinia, quinidia, cinchonia and cinchonidia, and for the detection of their admixtures, by means of the microscope, has been given by Dr. Richard Godeffroy and C. Ledermann. The distinctions revealed by the microscope are so characteristic that the method, which is a modification of that employed by Stoddart and by Schrage, cannot fail to be of high value. Besides these, an unusually large numbers of papers, relating to the preparation or the reactions of various cinchona alkaloids, or their salts, have been contributed. The efforts made to introduce the cheaper cinchona alkaloids to favor, have not met with the success their absolute value as antiperiodics deserves. A paper by Mr. J. E. Howard to the British Pharm. Conference last year covers this ground, and also considers the causes that have contributed to the high price of quinia.

The genus Viburnum is reviewed in an article by Prof. Maisch, whose attention was directed to it by some branches of a woody plant, identified as belonging to a species of this genus, which, under the name of "black haw," has the reputation in Florida of possessing valuable medicinal properties as a substitute for quinia. It is mentioned to differ from what is known by the name of black haw in some parts of the country, but owing to the absence of flowers and fruit, has not been further identified. Viburnum prunifolium, commonly known as black haw, has found considerable application during the past year as a nervine tonic. It would, therefore, be interesting to establish the difference, if any, between the two plants.

The genus Viscum has also attracted some attention during the year, owing to the alleged valuable oxytocic properties of the mistletoe. Dr. W. H. Long, who has an experience of twenty years with it, believes it to be superior to ergot: the mistletoe being more certain and prompt, and causing more natural uterine contraction; moreover, it is readily obtained. There appears to be no difference in its properties or strength by the kind of tree on which the mistletoe grows. In this connection the analyses of mistletoe from various trees, by A. Bontou and H. Grandeau, is interesting, because they show that there is a difference in these plants, not only in the ash, but also in the quantities of some of their organic constituents.

Opium and its constituents have, as usual, drawn out a large number of papers. It is interesting to note that Mozambique is likely to become an important rival of India for the opium trade with China. A company has been established under the patronage of the Portuguese government, and the lands appropriated are said to be adapted to opium culture, while a further advantage consists in the exclusive right to export opium free of duty for a period of twelve years. Several methods for morphiometric examinations of opium have been contributed. Among those extracted for this report, are also those that were communicated to the British Pharm. Conference in 1876, the reporter having failed to extract the "Year book of Pharmacy" for that year for last year's report. The chemistry of the opium constituents is represented by numerous papers, but with the exception of the discovery of a new principle by Messrs. T. & H. Smith, Meconoiosin, nothing absolutely new has developed. Meconoiosin is deposited from the mother liquors from which meconin has been crystallized, and has been obtained in handsome, large, colorless crystals, which are quite peculiar in shape and character. The new substance is interesting, because it is now the second chemically indifferent body, meconin being the only one hitherto known, that has been found in opium.

It is, perhaps, familiar to most members, that Mr. C. R. Alder Wright has for some years been engaged in the investigation of the chemistry of the aconite alkaloids, and that he has made some interesting reports on them. A third report on the subject was made to the British Pharm. Conference, at its meeting in 1877, by Mr. Wright and Mr. A. P. Luff. Their results, together with those that have previously been obtained by Groves, Duquesnel, Hübschmann and others, led them to very definite conclusions regarding these substances. Aconitum napellus roots contain a highly active crystallizable alkaloid, which they designate as true aconitia; a second alkaloid, crystallizable, but not readily yielding crystallizable salts, which they call pseudoaconitia; a third alkaloid, non-crystalline, and not yielding crystalline salts, and probably more or less of the decomposition products, aconia and pseudoaconia, which are certainly present in the extract of the root, and are produced by the action of alkalies on aconitia and pseudoaconitia. Aconitum ferox roots contain pseudoaconitia, a little aconitia and an apparently non-crystalline base. Aconitum lycoctonum roots appear to contain both aconitia and pseudoaconitia. The alcolyctia and lycoctonia of Hübschmann are products of alteration of aconitia and pseudoaconitia. Commercial so-called aconitia is a mixture of true aconitia, pseudoaconitia, variable quantities of their alteration products aconia and pseudoaconia, and of the amorphous unnamed bases. Duquesnel's process is the one most suitable for the extraction of aconitia, since the saponification of the alkaloids, whereby the less active alteration products aconia and pseudoaconia are produced, is less likely to occur. Some preliminary experiments on aconite root from Japan are also reported by Messrs. B. H. Paul and C. T. Kingzett.

The veratrum alkaloids have been the subject of several interesting researches. Messrs. Wright and Luff have investigated those of Veratrum sabadilla, and they find that sabadilla seeds, as well as commercial veratria, contain three alkaloids, which they propose to distinguish by the names veratria, cevadia, and cevadillia. The first is the Veratria of Couerbe, the second that of Merck, and the third resembles the Sabadillia of Weigelin and Dragendorff, although not proved to be identical with it. Like the aconite alkaloids, those of veratrum are saponifiable; that is, by the action of alkalies they are decomposed and yield secondary products. Veratria is split into a new alkaloid, verina and veratric acid; cevadia into cevina and cevadic acid, while cevadillia yields also cevadic acid, but it does not appear that a base has been determined. Alexander Tobien has investigated the alkaloids of the rhizomes of Veratrum Lobelianum, partly collected from wild plants in Austria, and partly from cultivated ones in Russia, in both of which Prof. Dragendorff had already found notable quantities of veratroidia. Mr. Tobien's results confirm the presence of both veratroidia and jervia in the rhizomes, and also in the young leaves of V. Lobelianum, while the dried rhizome of V. album yielded little jervia and more veratroidia.

Pilocarpia, the alkaloid of jaborandi, has been further studied by Mr. Gerrard; the nitrate, phosphate, hydrobromate, sulphate and hydrochlorate and acetate have been prepared; they are all crystalline, but the last three do not form crystals readily, being quite deliquescent. Mr. Kingzett has again analyzed the alkaloid, and has obtained figures which correspond very closely with those previously obtained. A new liquid alkaloid, sophoria, has been obtained by Dr. H. C. Wood from the seeds of Sophora speciosa. It evidently constitutes the active principle of the seeds, but requires further study both in this direction and in its chemical relations. Another new alkaloid is "pelletierina," discovered by Tanret in pomegranate bark, and named by him after Pelletier. It is also liquid, and forms very hygroscopic salts, which are very easily changed, becoming colored and acid by losing a portion of their base.

A journey to the so-called balsam coast in Guatemala, has afforded Theophil Wyss opportunity to witness the collection of Balsam of Peru. The description of the method pursued is quite interesting and corresponds with that given by Flückiger and Hanbury in "Pharmacographia." Outside of the small district embraced within the quadrangle formed by the port of Acajutla, the towns of Isalco and New San Salvador, and the port of La Libertad, there are only isolated trees found, and the balsam is never collected. The examination of copaiba has elicited several papers. Besides two papers on the examination of commercial copaibas, the one by Chas. A. Bowman, the other by Jos. Fulton, Mr. Louis Siebold contributes one, in which he reviews the various methods that have been proposed for determining the presence of fixed oils as adulterants of copaiba, and arrives at the conclusion that the simplest and at the same time most reliable method is that of evaporation on a watchglass. In the presence of 1 per cent. of linseed or castor oil, the residue is not sufficiently brittle to permit being reduced to powder, while with pure copaiba this is invariably possible. Larger quantities than 1 per cent. of fixed oil will cause the residue to be sticky or semifluid, and by mixing such copaiba with gradually increased quantities of copaiba of known purity, the quantity of adulterant can be very nearly estimated.

Prof. Jules Morel has contributed a highly interesting series of papers on the turpentines and oleoresinous products of the Coniferæ, which have been concisely extracted for the report, and will afford valuable material, both supplementary to the information usually contained in textbooks, and for general reference. A paper on the turpentine oils found in the European markets, by Dr. Godeffroy, and one on an examination of Russian oil of turpentine, by Mr. W. A. Tilden, may be mentioned in this connection as important. A highly important contribution also is that of Prof. Dragendorff, giving the results of some color reactions of volatile oils, determined by a student, Mr. Kossow, in his laboratory. Prof. Dragendorff has been engaged for some years in the endeavor to determine a method whereby volatile oils could be distinguished from each other with certainty. The present contribution may be regarded as a further step towards the solution of this intricate problem. Mr. E. Hirschsohn has also for several years been engaged in a series of examinations of a similar class of bodies,—the resins, gum-resins, and balsams. He has determined a series of reactions whereby these substances can be distinguished from each other, and has given a complete analytical course, which is now reproduced in this report, in the belief that the space required is well applied. Of the individual volatile oils, those containing thymol as a constituent have engaged prominent attention. Descriptions of the new antiseptic, and experiences in its preparation, and in its application, have been given by various authors. Attention is drawn by Mr. Gerrard to the important observation made by him, that commercial oil of thyme—

so-called oil of origanum—lately examined, contains very little or no thymol. He is inclined to believe that the thymol is separated from these oils before they are turned on the market. Mr. E. Buri has made an examination of the oil of Thymus serpyllum, in the expectation of finding thymol. He obtained instead a liquid phenol, solidifying at a much lower temperature than thymol, and evidently not identical with it, though closely related.

An instructive paper is that of J. Biel, on the commercial chlorine derivatives of ethyl-alcohol. In the manufacture of chloral, a number of by-products are formed—Æthyliden-chloride, Dichlor-ethyl-chloride, Trichlor-ethyl-chloride, Tetrachlor-ethyl-chloride, and Hexachloride of carbon—most of which have been introduced into medicine in form of the variable mixtures sold under the names of "Liquor Anæstheticus," "Liquor Anæstheticus Aranii," and "Liquor Anæstheticus Wiggers." Nitrous ether, and the spirit, have been the subject of several papers during the year. The directions given in the officinal formula for the preparation of spirit of nitrous ether, and the description of the product, were found to conflict with the experience of your reporter with it during several years. The records of his work have shown that the quantity of distillate required cannot be obtained readily, and that the stated specific gravity of the spirit is higher than that found in the carefully made products. Experiments made have shown that it is not necessary to obtain the full quantity of distillate in order to secure a spirit containing all the nitrous ether that the quantity of nitric acid directed is capable of forming. Calculation also proved that the specific gravity stated by the Pharmacopœia is higher than is likely to result, if the stronger alcohol directed is used for the dilution of the distillate. Moreover, the calculated specific gravity corresponds with that obtained in actual practice. To secure a preparation of uniform ethereal strength, the application of the method of the British Pharmacopœia to its own spirit was recommended, the distillate from the officinal quantities being diluted to one quart, tested as directed in the British standard, and diluted to a strength corresponding to 5 per cent. of crude ether, *i. e.*, such as is separated by the test. Recently Prof. James W. Mill and Mr. F. A. Goodman—the latter in reply to some of the questions raised in the paper first mentioned—have contributed their results of experiments on spirit of nitrous ether. Prof. Mill gives preference to a method depending on the direct action of nitric acid on alcohol. The distillate is to be washed with water, and the washed ethereal fluid is to be diluted to correspond to a strength of 5 per cent. by volume. Such a spirit has a specific gravity of 0.823, which is practically the same as that calculated for the officinal spirit. Prof. Mill also reports some experiments made to determine the solubility of his crude ether, when diluted with different proportions of alcohol, in saturated solution of chloride of calcium, so-called, and in water, which are quite interesting. A series of eight different experiments, made with the officinal proportions of material, are recorded by Mr. Goodman, and four that were made with different proportions. From his results it would appear that there does not exist that difficulty to obtain the required quantity of distillate, that has been pointed out in the paper of your reporter, and is also mentioned in the paper of Prof. Mill. Several interesting papers on spirit of nitrous ether have been contributed to English journals. Mr. F. M. Rimington discusses the character of the ether that is contained in the spirit, and the process of the British Pharmacopœia, which he regards to be unnecessarily complex; and Mr. J. Williams communicates a method, whereby a spirit, containing absolutely pure nitrous ether only, can readily be obtained, although the process is attended with some trouble. An important observation has been made by Mr. Williams also in connection with salicylic acid. When preparing some salicylic acid from oil of gaultheria, he was struck with the facility with which it formed large and well-defined crystals, and with the difference in their character from the artificial acid. Further investigation proved that the latter, as obtained from carbolic acid, is accompanied by a second acid, more soluble in water than commercial salicylic acid, which in its turn is more soluble than the natural acid. By suitable means he has succeeded in separating pure salicylic acid, corresponding in all its characters with the natural acid, from the artificial commercial acids, the best samples of which contain the second acid mentioned. The characters of pure salicylic acid are so distinct, in some directions, from those of even the purest commercial acid, that those hitherto attributed to the pure acid will require complete revision. The relations of salicylic acid to borax have been studied by Mr. E. Jahn, who has determined it to form certain well-defined compounds, not only with borax, but also with other borates. Salicylate of sodium has been the subject of several papers. Mr. Williams describes the sodium salt of his natural or pure salicylic acid to form handsome, pearly, crystalline plates, very different from the salt obtained with ordinary acid. Mr. E. Hoffman describes an acid salicylate of sodium—containing two mol. of acid to one mol. of base—obtained by dissolving one mol. of neutral salicylate of sodium and one mol. of the acid in alcohol, and crystallizing. The corresponding potassium, lithium, and ammonium compounds have also been obtained; all of them readily form crystals, which are permanent in the air, and with the salts appear to keep in concentrated aqueous solution, but are decomposed by dilution, salicylic acid being deposited.

Doubtless, the most important scientific achievement since our last annual meeting, is the successful liquefaction of oxygen, hydrogen, and nitrogen, by Raoul Pictet, of Geneva, and, at about the same time, by L. Cailletet, of Paris. All endeavors to reduce these gases to the liquid condition, by methods to which all other gaseous elements have succumbed, had hitherto proved futile, and the announcement of their new successful liquefaction, occurring as it did near to the close of the year 1877 (Dec. 25 and 31), may well be accepted as a "new year's gift," of no mean value, to science. A description of the apparatus employed to effect the liquefaction of these gases shows that, though the same in principle—as is the method pursued—they differ widely in their construction. It is remarkable also, that while Pictet employed a pressure of 500 to 650 atmospheres, and a reduction in temperature of—148° to 220° F., Cailletet has succeeded in condensing the gases under a pressure of from 200 to 290 atmospheres, and at a temperature of 18.6° F. The apparatus of Pictet, however, admits of the ejection of the gases in liquid, and even in the solid form. That of Cailletet, on the other hand, is better adapted to the lecture-room, since it renders the liquefied gases momentarily visible, and permits, by the aid of the oxy-hydrogen light, the projection of all the phenomena attending the liquefaction of gases on the lecturer's screen. The liquefaction of gases by both gentlemen has been verified before scientists of high standing.

Last year's report noted the discovery of two new metals, Neptunium and Lavæsium. This year's report brings the discovery of still another, Davyum, by Mr. Sergius Kern, who so named it in honor of Sir Humphry Davy. The new metal belongs to the platinum group, and has been extracted from a considerable quantity of so-called platinum sand. The quantity obtained is quite small, and has not permitted complete characterization;

yet the reactions obtained appear to be sufficient to justify Mr. Kern's opinion that the metal extracted by him is distinct from those hitherto known.

The comparatively new metal gallium has received further attention by Messrs. Boisbaudran, Jungfleisch, and Dupré. Its characters have been well defined, and point to its classification in the aluminium group.

A new sulphur acid—persulphuric acid—has been obtained by Berthelot. It was formed by causing the electric efluve, at a high tension, to act upon a mixture of sulphurous acid and oxygen, both perfectly dry, and is thus obtained in the anhydrous state. Its composition is S_2O_7. It is described as a thick, adhesive liquid, sometimes forming indistinct granular crystals at 32° F., and sometimes long, slender, flexible needles. It is quite unstable.

Several methods of obtaining solution of hydrobromic acid have been given. Dr. Hager gives one, depending on the action of hypomephite of sodium on bromine; Alexander Naumann another, depending on the behavior of bromine and bromide of sulphur to sulphuretted hydrogen; while Dr. E. R. Squibb gives a working formula for preparing a solution, corresponding in its bromine strength to one-half that of bromide of potassium, which is based upon the liberation of hydrobromic acid from bromide of potassium by sulphuric acid.

Phosphorus also has been made to yield a new acid—the hypophosphoric, PO_4. This is produced, according to Th. Salzer, together with the phosphoric and phosphorous acids hitherto known to be formed, when phosphorus is exposed to slow oxidation in moist air. The pure acids and some of its compounds are described.

A new class of ferrocyanides has been produced by Gaston Blong. By treating yellow prussiate of potassium with chloric acid instead of nitric acid, a compound forming black crystals is obtained, which forms the third in the series of prussides; the yellow being the first, the red the second, and the black, the new compound, the third. Persulphocyanic acid, the constitution of which remains still a matter of uncertainty, has been the subject of experiment by R. W. Atkinson. He details his experiments, which are being continued, but has not yet arrived at any definite results, whereby either the constitution of the acid, or of its compounds, could be decided.

Phosphate of calcium, for pharmaceutic uses, has been the subject of experiments by E. Hirschsohn and by W. Stœder. Mr. Hirschsohn finds that a preparation of constant composition, crystalline, ready solubility in hydrochloric acid, and, moreover, affording an abundant yield, may be obtained when an excess of chloride of calcium is precipitated by phosphate of sodium with certain precautions mentioned. Mr. Stœder's experiments were made on phosphate of calcium from calcined bones. After reviewing the various pharmacopœial processes in which bones are employed for the preparation of this compound, he finds that they cannot be depended on for the preparation of a product of uniform composition, and recommends the process of the German Pharmacopœia—from phosphate of sodium and chloride of calcium.

An allatropic modification of copper has been noticed by Prof. Schützenberger. It is obtained by the electrolysis of cuprous solutions, and is characterized by being less red than ordinary copper, brittle, absolutely devoid of malleability, and when moist, is oxidized with great rapidity.

The alterability of calomel has attracted the attention of several investigators. Jolly has found that light, dilute hydrochloric acid, chloride of sodium, citric acid, the hydrates of sodium, magnesium, and calcium, and carbonate of sodium, all have a tendency to change calomel into corrosive sublimate and metallic mercury. Experiments in the same direction made by Frederick M. Corwin have given similar results, although they disagree in some respects from those obtained by Mr. Jolly.

Many other interesting observations might be mentioned, but it is believed that sufficient has been said to characterize the nature of the "Progress" that has been made since the date of the last report to this body.

PHARMACY.

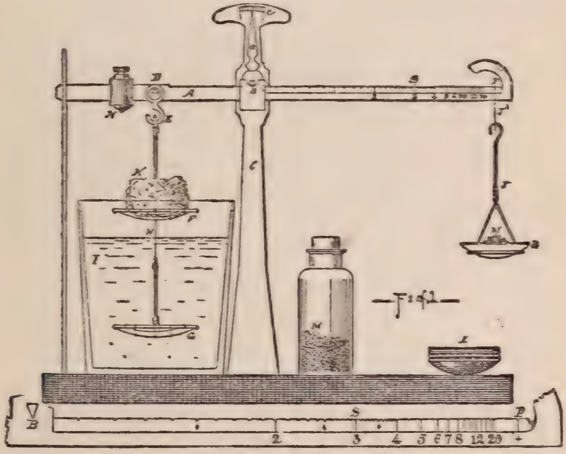
A. APPARATUS AND MANIPULATIONS.

Weights, Measures and Specific Gravity.

Scale-pans of Rubber.—The pans of hand balance are now frequently made of hard rubber (ebonite), and when so constructed they possess many advantages over those made of metal. G. Christel has, however, observed that when one of the pans is rubbed with a woollen or silk rag the balance becomes inaccurate, however accurate it may have been before; the pan that was rubbed being attracted to the surface of the countertop, over which the weighing is done. This is doubtless due to electric action, since the same pan, after friction, is repelled by a piece of sealing wax which has been rubbed in the same way, and is brought near to it. A surface covered with oil cloth attracts more than does that of an ordinary oak table. This property utterly unfits hard rubber scale pans for delicate balance, since the simple process of dusting with a rag, whether silk, woollen or linen, incites electric action. Arch. Ph. Aug., 1877, p. 140.

New Specific Gravity Balance.—R. Parrish is the inventor of an instrument, Fig. 1, which may be used in chemical laboratories or mineralogical field work, and by the aid of which specific gravities of common minerals and other solid substances heavier than water can be quickly and conveniently determined, without resort to mathematical calculation, and without regard to exact weight. The instrument is adjusted to accurate balance with the counterpoise *J*, and its loop *J*^{1}, removed from the beam *A*, but with the double basket, *F*, *G*, in position, and the vessel *I* supplied with water, as indicated. In determining the specific gravities the mineral *K*, or other solid to be tested, is placed in the basket, *F*, and the pan-holder or counterpoise, *J*, is adjusted to the position, *P*, established at a convenient distance from the fulcrum, *B*, and marking the extreme working length of the lever arm. One or more of the pans, *L*, are placed upon

FIG. 1.

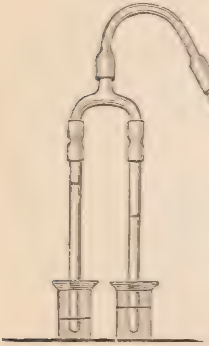


Specific Gravity Balance.

the receiver, *J*, to counterbalance the weight of the mineral, and a sufficient quantity of granulated copper or sand is placed in the pan to cause the beam, *A*, to stand in equilibrium. The mineral, *K*, is then removed from the upper (*F*) to the lower basket (*G*). The counterpoise and its load is then moved towards the fulcrum to a position (*S*, for example), where it just counterbalances the submerged mineral. This position corresponds with the specific gravity of the mineral, and the amount, being indicated on the graduated scale, can be read off directly. New Rem., July, 1877, p. 202, from Scient. Amer.

Simple Specific Gravity Apparatus for Liquids.—James Tayler draws attention to a simple specific gravity apparatus, which is useful for approximately determining specific gravities of liquids in cases where the hydrometer or specific gravity bottle are not applicable or would take up too much time. The apparatus (Fig. 2) is very readily applied, even with tolerably small quantities of liquid, and easily gives results correct to the first decimal place. Two straight pieces of glass tubing, 5 to 10 m.m. bore, and 250 m.m. long, are joined by caoutchouc tubing to two ends of a T-joint, which have been bent so as to be parallel. The third end of the T-joint has a piece of caoutchouc tubing of convenient length slipped on, and this is stopped by means of a bit of glass rod. Two small beakers, a rule, and any convenient stand, arranged so as to hold the long tubes vertically, complete the apparatus. Its application is almost obvious. On pouring a little distilled water in one beaker, and the liquid whose specific gravity is to be determined into the other, bringing the beakers under the two vertical tubes, so as to immerse the ends of the latter in the respective liquids, and partially exhausting above, the liquids will rise to heights depending on their relative densities. The plug is now inserted; the lengths of the liquid columns are measured, and the specific gravity required is obtained by dividing the length of the water column by that of the other.* Ch. News, Oct. 12, 1877, p. 168.

FIG. 2.



Specific Gravity Apparatus.

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* In a subsequent communication the author states that he had since learned that the same apparatus is described as Hare's hydrometer in Bird and Brooke's Nat. Philos.

A New Gravimeter.—In an interesting paper presented by I. I. Mann, on the subject of testing the strength of Portland cement and other materials of the same class, reference is made to the mode of determining their specific gravity, and a very simple and practical method is suggested by the author of the paper. He employs an ordinary specific gravity bottle and a graduated pipette, which holds the same quantity of fluid as the bottle, the measure in both being indicated by a cut on the glass; a known quantity of cement, say 100 grains, is introduced into the flask, and the remaining space is filled from the pipette with any liquid which will not dissolve the cement or cause it to set. It only remains to observe the height at which the liquid stands on the scale in the pipette, which is graduated experimentally, in order to ascertain the density of the substance experimented upon. This contrivance dispenses with the somewhat tedious process in ordinary use for taking the specific gravity of solids in a powdered condition, and is not unlikely to become of more general utility than anticipated by the gentleman who introduced it. New Rem., Aug. 1877, p. 233.

Baumé's Hydrometers.—These instruments seldom correspond as furnished by different manufacturers. Berthelot, Coulier, and d'Almeida have communicated a comprehensive explanation of the method by which the instruments may be verified, the following being extracted from the paper of authors:

I. *The Definition of the Fixed Points of his Hydrometer as given by Baumé.*—In the eighth edition of his *Eléments de Pharmacie*, published during his lifetime, he says (vol. i. p. 341), literally: "A glass hydrometer (aräometer, senkwaage) is taken, and the point at which it no longer sinks in meter, is marked zero; this is the first point (*terme*). To determine the second point a solution of 15 pounds of pure dry cooking salt in 85 pounds of water is prepared, the instrument is immersed in this, and the point at which it just protrudes out of it is marked 15, this being the second point. The space between these two points is divided into 15 equal parts or degrees. The space so graduated serves for the division of the lines part of the tube (*stem*) in the same manner. All of these operations must be performed in a cellar and the liquid must remain therein sufficiently long to acquire the proper temperature, which should be 10° (Réaumur) above the freezing-point of water, or 12.5° C."

These were Baumé's own instructions, and the instruments accurately constructed according to them must necessarily correponds with each other, while, if any deviation is permitted, the results must necessarily differ.

II. *Density of the Normal Solution, and Tables.*—The starting-point of all operations having the purpose of the construction and verification of Baumé's hydrometers is the preparation of a normal solution of salt and the determination of the weight of 1 liter of this solution. The weight of a liter of solution, prepared as above directed, was found to be 1110.57 grams, its temp. being 12.5° C. (= 54.5° F.), the atmospheric pressure being 760 millim., and the weights used of brass. From this, and from the weight of a liter of water at the same temperature and atmospheric pressure, the authors have constructed the following table:

Upon the Relation of the Degrees of Baumé's Hydrometers to the Weight of a Liter of Liquid, weighed at a Temperature of 12.5° *C.* (= 54.5° *F.*), *and under an Atmospheric Pressure of* 760 *Millimeters.*

Degrees.	Liter-weights. (grams.)	Degrees.	Liter-weights. (grams.)	Degrees.	Liter-weights. (grams.)
0	998.404	26	1210	51	1520.5
1	1005	27	1220	52	1536
2	1012	28	1230	53	1552.5
3	1019	29	1240.5	54	1569
4	1026	30	1251	55	1586
5	1033	31	1262	56	1603
6	1040	32	1272.5	57	1620
7	1047.5	33	1283	58	1638
8	1055	34	1295	59	1656.5
9	1063	35	1306	60	1675
10	1070.5	36	1318	61	1694
11	1078	37	1330	62	1714
12	1086	38	1342	63	1734
13	1094	39	1354	64	1754.5
14	1102	40	1366	65	1775
15	1110.57	41	1379	66	1797
16	1119	42	1392	67	1819
17	1127.5	43	1405	68	1841.5
18	1136	44	1418.5	69	1865
19	1145	45	1432.5	70	1889
20	1154	46	1446.5	71	1914
21	1163	47	1460.5	72	1938
22	1172	48	1475	73	1964
23	1181.5	49	1490	74	1990
24	1191	50	1505	75	2017
25	1200.5				

This table can not only be used at 12.5° C. (= 54.5° F.), but may also be used at temperatures up to 15° C. (= 59° F.) and a little above, because no material errors are thereby occasioned. It. is, however, under these circumstances necessary to remember, that when the instrument sinks in a liquid of a certain temperature, *e.g.*, 14°, to a certain point, the table will indicate the weight of a liter of the liquid at a temperature of 14°.

III. *Verification of the Hydrometer.*—For this purpose one of two equally good methods may be employed.

1. The hydrometer is first determined to sink exactly to zero in distilled water having a temperature of 12.5° C. (= 54.5° F.). The weight of one liter of liquids of various densities, such as more or less concentrated solution of salt, sulphate of zinc, sugar, glycerin, sulphuric acid, etc., is ascertained; the hydrometer is immersed in the liquid, which, during the operation as well as when its weight is determined, must have the above-named temperature. The hydrometer now indicates the degree corresponding to the weight of the liquid as given in the table. If it is desirable to verify the entire scale, solutions must be selected whose liter-weights range from 1000 to 2000 grams.

2. The second method requires the aid of a good balance, the beam of which permits raising and lowering. A silk thread or a hair, 12 to 15 centim. long, is attached beneath one of the pans (A), and to the lower end of the thread or hair, a piece of soft wax, the size of a pin's head, to which the hydrometer is to be fastened. The quantity of weights likely to be required during the weighings, is then placed on the same pan, the hydrometer is immersed in water at the proper temperature, and the equilibrium of the balance restored by placing weights on the opposite pan (B); this counterpiece being left on the pan (B) during all the following verifications. The hydrometer is now weighed in air, and its weight noted. It is now again immersed in water until it sinks to zero, the vessel containing the water and hydrometer is placed beneath the pan (A), the thread is attached to the stem of the hydrometer and weights are gradually removed in quantities corresponding to the weight of the hydrometer in air multiplied by 0.03367, 0.06733, etc. (as given in the following table). The beam is then raised until the tongue of the balance stands at O, when the hydrometer should indicate the degree which is opposite to the multiplicator (0.03367, 0.06733, etc.).

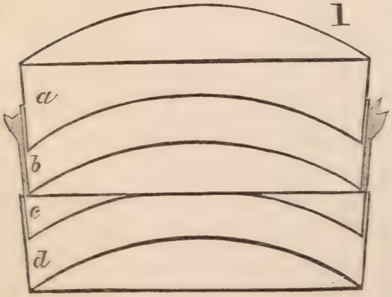
Degrees indicated.	Multiplicator with which the weight of the hydrometer must be multiplied.	Degrees indicated.	Multiplicator with which the weight of the hydrometer must be multiplied.
5	0.03367	45	0.30300
10	0.06733	50	0.33666
15	0.10100	55	0.37033
20	0.13467	60	0 40400
25	0.16833	65	0 43766
30	0.20200	70	0.47133
35	0.23566	75	0.50500
40	0.26933		

If for example the 25th degree of a hydrometer, weighing 57.3 grams in air, is to be verified, this weight is multiplied by 0.16833, which gives 9.645 grams. This ascertained weight being removed from pan (A), the balance is elevated until the tongue stands at O, when, if the hydrometer is correct, and the water at the proper temperature, it must indicate 25°. The hydrometer must be moistened a few degrees above the point of immersion, and the point must be read off in the same manner as when graduating tubes. Arch. Ph., Nov. 1877, pp. 429–432.

MECHANICAL DIVISION, PRECIPITATION.

Sieves.—C. A. Müller draws attention to the following simple sieve-arrangement (Fig. 3), whereby the same frames will serve for sifting gauze (bolting-cloth) of various fineness. It consists of the cover *a*, the two rings *b* and *c*, and the bottom *d;* all of which are constructed of thin sheet-iron, coated with a good neutral varnish. The joints of the rings are made by causing the edges of the strips of sheet-iron to meet, and soldering them together, thus securing a perfectly smooth inner and outer surface. The lower edge of the ring, *b*, is turned inwards, at right angles, for about ½ ctm., and the sifting-gauze being spread over it, the ring, *c*, is slipped on and holds it firmly and well stretched in its proper position. The diameter of the

FIG. 3.



Apparatus for Sifting.

lid, being about 30 ctm., the rings and the bottom are successively somewhat smaller, the height of each part being about 8 ctm., and the diameter of the sifting-cloth about 40 ctm. The latter, when not in use, are best kept spread out smoothly between sheets of pasteboard. As a matter of course, the sieve-arrangement may be constructed of any desirable size.—Arch. Ph., April, 1878, p. 338.

Washing out Flasks containing Precipitates by Inversion.—To wash a precipitate out of a flask completely is often a tedious operation, especially if the precipitate is heavy, etc. P. Townsend Austen overcomes the difficulty by the following simple methods:

(1.) *The Flask contains a Hot Liquid.*—The flask, which ought for the sake of convenience to be half full, is suddenly inverted in a dish, the larger the better, containing as much liquid as in the flask. This operation requires a little skill. It is most easily performed by holding the mouth of the flask over the rim of the dish, then gradually inverting the flask, and as soon as the liquid begins to flow out, suddenly inverting it, putting the mouth of the flask entirely under the surface of the liquid, and at the same time bringing it by a swift motion to the middle of the dish. After a few seconds the cooling of the air in the flask occasions a partial vacuum and the liquid rises in the flask. If the liquid has been at a boiling temperature the flask will be almost filled. After the liquid has ascended, the flask is firmly held by the neck with one hand, while the other grasps the bulge. By gently shaking the flask the liquid slaps against the top (bottom) and sides, thus dislodging completely all adhering particles. A slight revolving motion is then given, and the solid particles go quickly down the neck of the flask into the dish. After all the substance has been removed, the flask is gradually tilted and the liquid allowed to run out, or the exit of the liquid may be effected by introducing a bent tube into the flask. The liquid in the dish must be warm.

(2.) *The Liquid in the Flask is Cold.*—The flask is inverted in the manner described. A bent tube is introduced into the flask and the air partly drawn out. The operation is then conducted as in the other case.

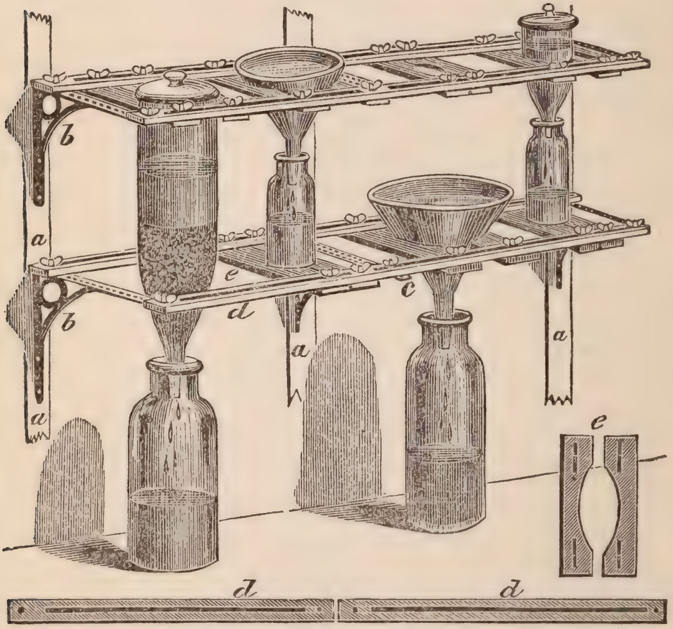
If it is not desirable to increase the volume of liquid in the flask, the latter may be inverted into an empty dish.

The method is not very applicable to liquids holding light precipitates in suspension; but even under these conditions good results may be obtained by agitating the liquid occasionally so as to prevent depositions on the sides.—Chem. News, August 10, 1877, p. 57.

SOLUTION, PERCOLATION, DIALYSIS.

New Percolating and Filtering Stand.—Prof. Joseph P. Remington recommends and describes the percolating stand illustrated by the annexed figure (4). Three upright strips (*a*), four and a half feet long, one and a half inch wide, and three-quarters of an inch thick, are fastened to the wall, as shown, two feet nine inches apart, over the working counter. Six iron japanned brackets (*b*), 15 x 9, are now fastened by screws to the upright strips, three of them in the same plane, the top of the bracket eighteen inches above the level of the counter, and the other three in the same plane; the tops of these twenty two inches above the tops of the lower set. The longest limbs of the brack-

FIG. 4.



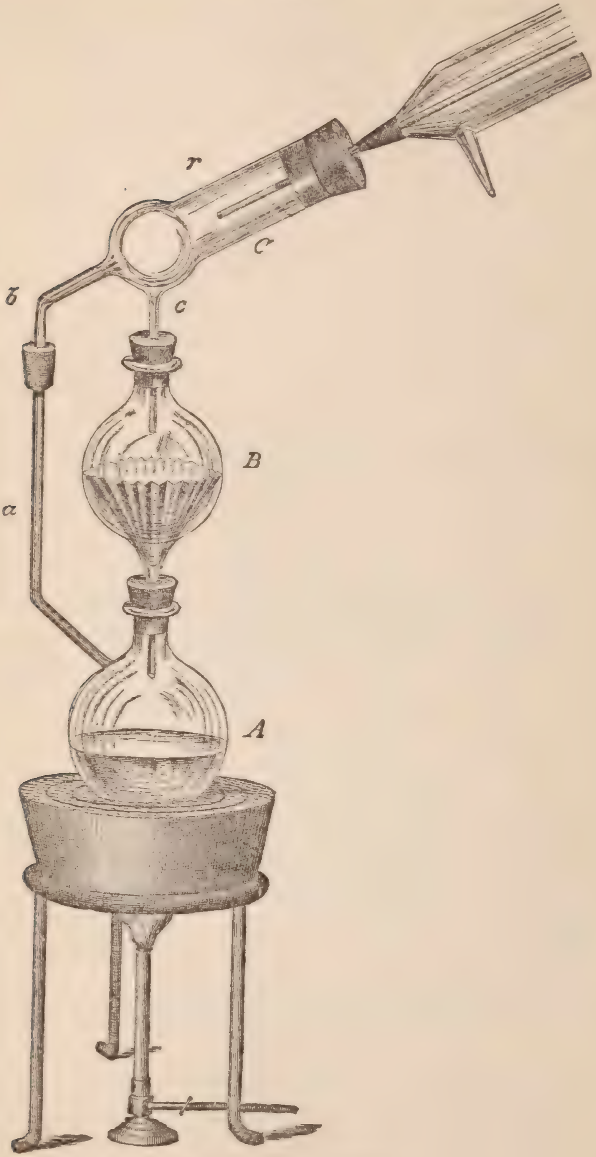
Filtering and Percolating Stand.

ets are placed horizontally, and are perforated by drilling half-inch holes, one inch apart, along the edge of four of them (the outside edge is preferred), whilst two of the brackets (those designed for the middle supports (*c*) should have holes drilled on both edges). Upon the brackets the horizontal strips (*d*) are laid; these should be of black walnut or other hard wood, and are two feet nine inches long, one inch thick, one and three-quarter inches wide; a slot, half inch wide, is cut into each of these horizontal strips through the middle, but not extending quite the whole length; the strip should be left solid for a distance of three inches from the ends. The crosspieces (*e*) are made of black walnut, and are fifteen inches long, two and a half inches wide, one inch thick; a slot, half inch wide, is cut in the same manner in them, but it does not extend the whole length, leaving one and a half inch solid at the ends. These crosspieces should be in pairs, and seven or eight pairs should be made, varying the curves, in order to better accommodate the various-shaped percolators, funnels, etc., which may be used; the sides of the curved cross-strips should be bevelled, for the same reason. Iron carriage-bolts, ⅜ inch, three inches long, with the nut replaced by thumb-screws, are used for fastening the horizontal long strips to the brackets, and also the crosspieces to the horizontal strips; iron washers should be used with the thumb-screws to prevent injury to the wood. The varied application of this stand and its advantages are readily understood.—A. J. Ph., Dec. 1877, p. 589.

A New Apparatus for Continuous Displacement.—In the "Report" for 1877 (Proceedings, 1877, p. 49), an apparatus, constructed by P. Cazeneuve and O. Caillol, for the exhaustion of solid powdered substances by means of volatile menstruum, was described. A similar apparatus, designed by E. Drechsel, which has, however, some advantages, is shown in the cut, Fig. 5.

It consists of three parts: The flask, *A*, the globe funnel, *B*, and the adapter, *C*, which is itself connected with a return condenser. The flask, *A*, is provided with a lateral, rather wide glass tube, *a*; the funnel, *B*, is somewhat smaller in capacity than *A*, has a neck about 20–25 mm. wide, and a tube which is cut off obliquely at the bottom. The construction of *C* is evident from the figure, it being only necessary to remark that the end of the tube, *b*, is joined to the lateral tube, *a*, of the flask by means of a well-fitting cork, and that the proper adjustment of the ends of both tubes may be accomplished by boring the holes in the corks of the flask, *A*, and the funnel, *B*, somewhat eccentrically, so that a simple turning of one or the other may bring

FIG. 5.



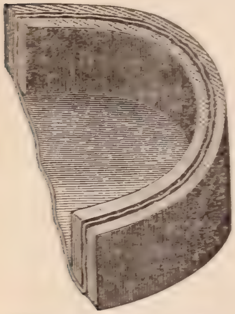
Displacement Apparatus.

about the correct position. A finely-plaited filter having been introduced into the funnel, the substance to be exhausted is placed into it; the liquid to be used, such as chloroform, alcohol, ether, benzol, &c., is introduced into the flask, and, after all connections have been made tight, heat is applied by means of a water-bath. The whole apparatus is then left until the exhaustion of the substance is complete. New Rem., Nov. 1877, p. 328; from Zeitschr. Anal. Ch.

Dialysis—Practical Hints.—Dialysis is a species of osmosis, that is, a diffusion or passage of fluids through organic membranes. The late Thomas Graham, to whom we are indebted for the first knowledge of the law of diffusion, divides bodies, in respect to their diffusibility, into two classes: one of these he termed *crystalloids*, being mostly crystallizable substances, or closely resembling them in character. They have a close affinity for their solvents, and retard the evaporation of the latter by their presence. The other class he denominated *colloids*, which are uncrystallizable, of a glassy or horny structure when dry (like gelatin, etc.), and generally of an insipid taste. These two classes of bodies may be almost entirely separated from each other, by placing the mixture containing them on one side of an organic membrane, which is in contact with water on the other. A double osmosis then takes place: from one side crystalloids pass through the membrane into the water, and from the other side water passes into the mixture. The ratio of diffusion is inversely proportionate to the densities of the liquids on either side; a dense liquid will pass slowly; a dilute liquid, or pure water, more rapidly. The colloid substances, however, are not absolutely retained on one side; they also pass through the membrane, but at so slow a rate that the crystalloids may nearly all have penetrated the membrane before an appreciable amount of colloids has accompanied them.

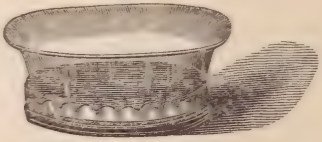
The apparatus employed for this process is generally constructed in the following manner: A light hoop of wood, or of gutta percha (Fig. 6), or better, of glass (Fig. 7), about 2 inches deep and 5–10 inches in diameter, is covered with a piece of moistened bladder or parchment-paper—which have been found in practice to be the most suitable membranes for this purpose—so as to form a sieve-like vessel. The disk of bladder or parchment-paper should be considerably larger in diameter than the hoop, and it should be bound to the latter by a string, or by another hoop of the same material. The membrane must be entirely free from vents or pin-holes, which may be ascertained by sponging one side with water, and observing whether any wet spots appear on the other side. In the latter case, the defects may sometimes be remedied by applying liquid albumen, and coagulating it by heat. Broad glass shades, or lamp-chimneys, or similar articles, may also be used. In the absence of these, a funnel, the neck of which is broken off, may answer; only in this case the membrane is placed inside of it, folded in the shape of a star-filter, The apparatus then, prepared in either way, is called the *dialyser*. This is floated upon a quantity of pure water contained in another larger vessel, which has received the name "*exarysator*." The size of the latter and the amount of water contained in it depend upon the object to be accomplished. If the colloid substance remaining in the dialyser be the chief object, it is best to employ a large quantity of water at once; the crystalloid bodies pass into this in the form of a dense solution, which sinks to the bottom and causes the lighter unsaturated water to be constantly pushed up towards the membrane. If we, however, want to separate the crystalloids, to the neglect of the colloids, we must use as small a quantity of water as possible. The liquid to be dialysed is poured into the dialyser to the height of about half an inch, or a little more, but never exceeding one-fourth of its depth, and the apparatus then floated on the water in the exarysator. The best way is to introduce just as much liquid into the water to one-third of the height of the contained liquid. These precautions are necessitated by the fact that water will diffuse upward into the dialyser more rapidly

FIG. 6.



Dialyser of Gutta Percha.

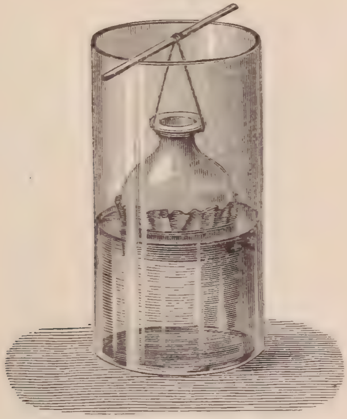
FIG. 7.



Dialyser of Glass.

than the crystalloid will pass through the other way; and this is more particularly the case when bladder is used. It is useful to suspend the dialyser in such a manner as is shown in one of the cuts (Fig. 8). The solution of crystalloid produced in the surrounding water is called *diffusate*. In most cases the diffusion may be greatly accelerated by the application of a gentle heat. New Rem., Aug. 1877, p. 228.

FIG. 8.



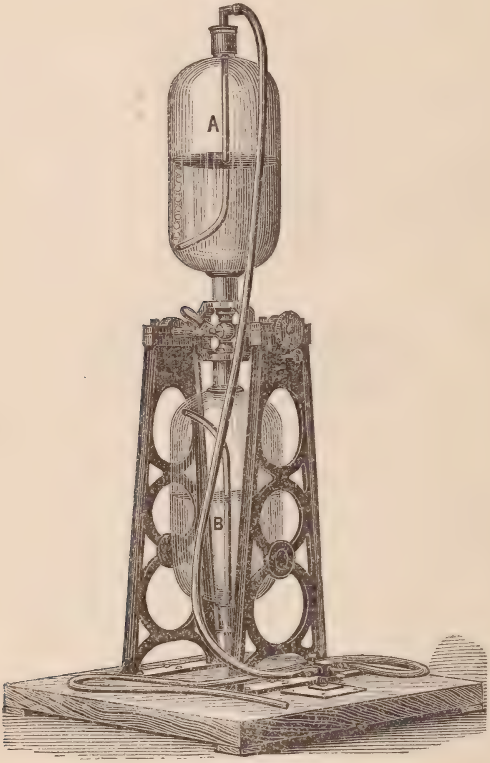
Apparatus for Dialysis.

Richard V. Mattison, at a recent meeting of the Alumni Association of the Philadelphia College of Pharmacy, read a paper on "Dialysis," in which that process is well described. See A. J. Pharm., March, 1878, p. 102.

ASPIRATORS, FILTRATION, ETC.

A Double Aspirator.—Robert Münke describes the double aspirator (Fig. 9), as follows: Two glass cylinders, of known and equal capacity, are connected together by brass fittings, in the manner shown in the cut, and the communication between them may be regulated by a stop-cock. They are mounted on a steel axle, supported by cast-iron frames, which are fastened to a solid support. At the upper end of one of the frames a spring insures and maintains the perpendicular portion of the apparatus. The distant ends of the glass-cylinders, which are likewise mounted with brass, carry each, two interior glass tubes, reaching nearly to the bottom of each cylinder, and a bent outer tube, to which is attached a rubber tube, leading from each cylinder to the stop-cock fastened to the base. This latter stop-cock is tapped in such a manner that, if turned in the position shown in the cut, it causes communication of the cylinder, A, with the vessel or apparatus from which the air is to be exhausted, while at the same time it gives escape to the air contained in B. As soon as the upper cylinder is empty, by pressure upon the spring-catch the axle is rendered movable, the apparatus swung half round and the stop-cock at the base turned 180° (one-half round). In this position B, which is now above, becomes the aspirator, while A, which is below, discharges its air. The apparatus may, therefore, be used almost uninterruptedly, and is especially serviceable for physiological laboratories. N. Rem., July, 1877, p. 196.

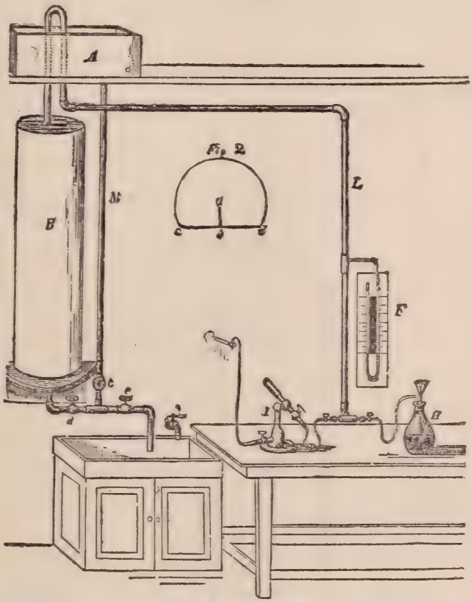
FIG. 9.



Aspirator.

Apparatus for Producing a Blast or Vacuum in Laboratories.—The apparatus shown by Fig. 10, was contrived by G. Henry Hanks. and is in successful use in his laboratory. It will produce either a blast or a vacuum, at will, and is thus described: The tank, *A*, may occupy any convenient position, at an elevation of

FIG. 10.

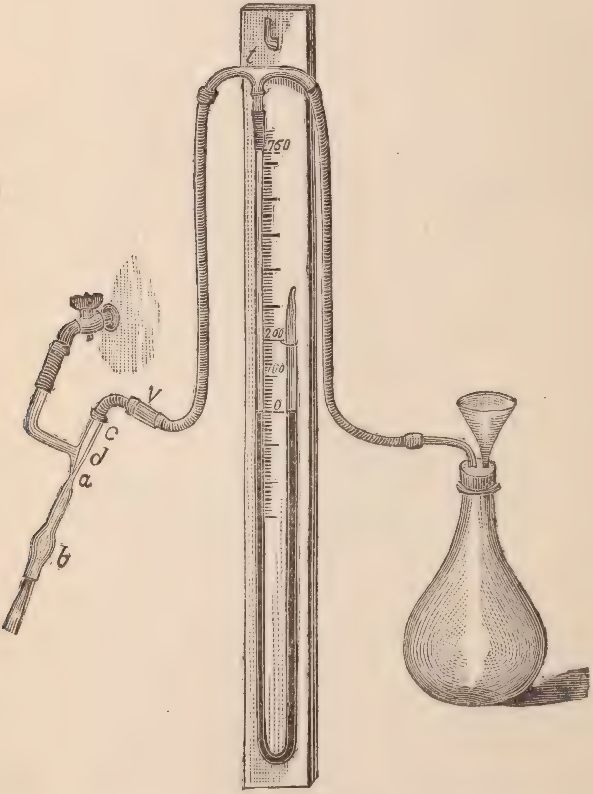


Blast Apparatus.

about ten feet above the bottom of the galvanized iron cylinder, *B*, into which water can freely flow through the half-inch iron pipe, *M*. A ball-cock, not shown, regulates the supply of water to the tank. The cylinder is ten inches in diameter and between five and six feet high. When a blast of air is required the globe-valves, *C* and *D*, are opened, and *E*, is closed. As the water enters the cylinder from below, and gradually rises, the air is compressed, and the level of the mercury in the manometer, *F*, will indicate the pressure. When the mercury has risen one inch the compressed air may be allowed to escape by turning the pillen-cock, at *I*, which, in the illustration, is intended for a gas-burner. The tube, *L*, must be carried above the level of the tank, to prevent the passage of water into the air-tubes. To produce a partial vacuum the cylinder may be partly filled with water, the valve, *C*, being closed. The valve, *E*, is to be closed while the cylinder is filling. The compressed air is then allowed to escape. The value, *E*, is opened and the water allowed to run into the sink. This causes a partial vacuum in the cylinder, and the tendency of air to pass in through the tube, *L*, to fill this vacancy can be utilized in many ways. In localities remote from places where the sheet-iron cylinder could be had, it and the tank as well, may be replaced by a couple of air-tight barrels. N. Rem., Sept. 1877, p. 262.

Filter Pump.—E. Rennard gives a description of Buck's filter pump, which recommends itself by its simplicity and cheapness.

FIG. 11.



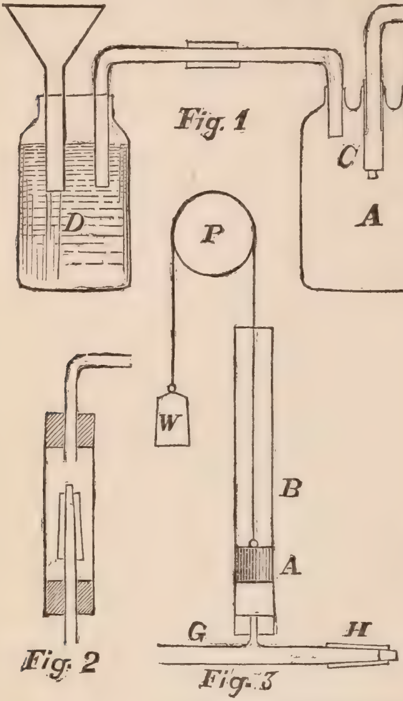
Filter Pump.

Its construction will be understood from the accompanying cut (Fig. 11). A strong glass tube, of 6-8 mm. bore, and 15 cm. long, is drawn out near its upper third to about half the original diameter (*a*). Upon this is blown, at *d*, a lateral tube, bent at a right angle, and, at *c*, a short tube, ending in a fine point and reaching just to the contracted portion, *a*, is fused into the end of the latter tube. The lower portion is either bent at right angles, or better, a small bulb is blown upon it near the end, as seen in the cut. The lateral tube is connected by means of rubber tubing with the water faucet, and the end, at *c*, is connected with the outer limb at the manometer tube. At *v*, however, there is interposed a check-valve, to prevent any water from passing back into the manometer. This check-valve is constructed on Bunsen's principle. A small glass tube is closed at one end, and a small hole is blown into its side, about 4 mm. from the point. A short piece of rubber tubing, which must fit snugly, but without pressing the tube, is slipped over it, and a slit, about 1 cm. long, is made a little to one side of the hole. On blowing into the open end of the tube the air will escape through the hole and slit; but on applying suction, the hole is tightly closed by the rubber, and will allow nothing to pass. The little valve is slipped into a larger tube, and its open end fused together with the end of the outer tube. On inserting this check-valve into the rubber connections at *v*, the open end must be made to look towards *c*. The manner of applying the apparatus for filtrations is self-evident from the illustration. N. Rem., March, 1878, p. 77; from Ph. Zeit. f. Russ, 1878, 673.

Apparatus for Rapid Filtration.—Robert C. Hindley describes the apparatus illustrated by Fig. 12. To one of the necks of the Woulff bottle, *A* (1), is attached a glass tube, *B*, about ½ an inch in diameter, and from 3 to 6 feet long, dipping into a jar, *E*, containing water. The middle neck carries a tube, *C*, which is an inverted Bunsen rubber valve, shown in (2). The third tubulure connects the Woulff bottle with the flask, *D*, which carries the funnel. A rubber connecter between the two enables the operator to empty the filtrate, wash the precipitate, cleanse the flask, *D*, etc. By suction with the mouth at the tube, *C*, a pressure of from 1 to 2 lbs. on the square inch may be obtained, as shown by the rise of the water in the tube, *B*, and can easily be kept within certain limits.

By the addition of the following, the pressure, as indicated by the water column, *B* (1) (or other suitable manometer), may be kept uniform. *B* (3), is a glass tube at least an inch in diameter, to which is fitted a weighted solid plunger piston, *A*, more than counterbalanced by the weight, *W*. The lower end of the tube, *B*, is connected to one of the arms of the "*T*," or "*Y*," *G*. Another of these arms terminates in a rubber valve, *H* (as above), opening outward, and the third arm is connected with the tube, *C* (1). When the weight is lifted, the piston sinks, the air being driven out at *H*, and the subsequent rise of the piston creates a pressure which may be modified by the addition or subtraction of small weights from *W*. The valve, *C* in (1), prevents the fall of the water column, etc., when it is necessary to raise the weight, *W*. New Rem., April, 1878, p. 113, from Scient. Amer. Suppl.

FIG. 12.

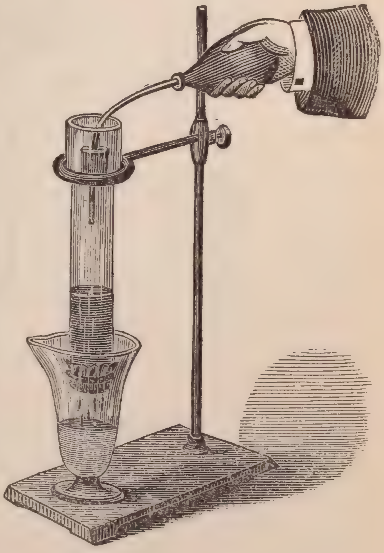


Apparatus for Rapid Filtration.

Simple Suction Arrangement for Rapid Filtration.—C. Holthof describes the following apparatus: A large flask, holding 5 or 6 liters, is connected by a caoutchouc tubing with another flask, through a cork, in which passes a funnel containing the filter. The large flask is also connected with a manometer, and with a short piece of glass tubing, which again passes through a cork into a tube shaped like a chloride of calcium tube. To the end of the short glass tube, within the chloride of calcium tube, is fitted a piece of caoutchouc tube, the other extremity of which is closed by a glass rod; a slit is made in this caoutchouc tube, which is thus transformed into a Bunsen valve. The narrow end of the chloride of calcium tube passes downwards through a cork into the lower part of the cylinder of an air-pump, or into an ordinary large-sized zinc syringe. The syringe or air-pump cylinder communicates with the outer air by means of a short piece of glass tubing passing through a second hole in the cork; this glass tube is also closed by a Bunsen valve. When the piston of the syringe or cylinder is drawn back, the valve in the little piece of tubing closes and shuts off connection with the outer air, while that in the tube, within the chloride of calcium tube, opens by reason of the increased pressure from within, and allows the air in the large flask to rush into the cylinder or syringe. J. Chem. Soc., Oct. 1877, p, 508. Zeitsch. Anal. Ch. XVI.

Rapid Filtration.—R. V. Mattison draws attention to a simple apparatus devised by Messrs. Sykes and Newton, of Hartford, Conn., which is very useful for the rapid filtration of syrups, etc. The device is illustrated by Fig. 13. A lamp chimney, with an enlarged base, is fitted into the ring of a retort-stand, cloth or muslin being wrapped around the ring in order to make a snug fit. A circular or square piece of muslin is covered by a similar piece of filtering-paper, and the two are bound firmly over the open lower extremity of the inverted chimney with the paper inwards, and secured by means of a rubber band. If the tube is now filled with liquid it will filter slowly; but filtration becomes rapid if a good velvet cork is fitted into the upper extremity, and, through an opening in the cork, the air is forced into the

FIG. 13.

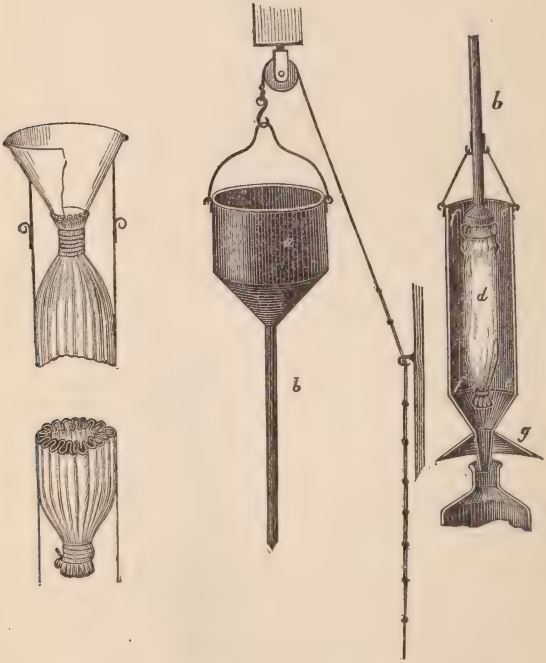


Rapid Filtration by Pressure.

tube by means of a bulb, such as is used in the small atomizers or syringes. A. J. Ph., March, 1878, p. 105.

Filtering Apparatus.—The filtration of viscid, syrupy, or muddy liquids is connected with many difficulties, the principal one being the deposition of sediment upon the whole filtering surface, whereby the passage of the liquid is either retarded or entirely prevented. The difficulty is sometimes overcome by introducing the liquid into tall, narrow bottles, whereby the sediment is allowed to deposit, the supernatant liquid drawn off almost clear, and filtered by itself. But if this bottle or jar had consisted of linen or muslin, instead of glass, the liquid column above the sediment, would have oozed through the fabric and a clear filtrate would have been at once obtained. This is precisely the principle of Taylor's, or the so-called sugar-house filter (Fig. 14), which consists of a narrow bag of muslin, open above and below, one end of which is gathered in regular plaits, and tied, while the other end is tied around the spout of a funnel, the lower orifice of which is somewhat trumpet-shaped, to prevent the filter-bag from

FIG. 14.

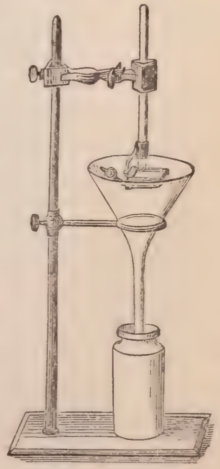


Filtering Apparatus.

slipping. The spout of the funnel may be ½ inch wide, and 4 inches long; the filter-bag may have a length of 1 to 3 feet. Another open bag of muslin, much narrower than the first, is now slipped over the latter, for which purpose this must be pressed or folded together, and finally the two bags are entered into a cylindrical tube of tinned iron of at least their own length. The filtering apparatus having been suspended properly, it is filled with the liquid, which soon begins to run through with remarkable rapidity and brilliancy. This is owing to the fact that the outer sack or bag prevents the bulging of the inner, and therefore insures a greater height of the liquid, while the sediment sinks down into the lower end, and leaves the pores of the fabric unobstructed; the tin tube, moreover, prevents radiation and evaporation, especially in the case of warm liquids. The apparatus may be combined with pressure by lengthening the funnel spout, so as to considerably heighten the column of liquid to be filtered. The funnel, *a*, is provided with a tube, *b*, being about 3 or 4 feet long, the lower end of which carries a shoulder for securing the upper end of the bag, which may have a length of 1 or 2 feet. The latter is surrounded by a tin tube, *f e*, to prevent radiation and loss by squirting, and is provided with a hood, *g*, to prevent the entrance into the flask of spilled or overrunning liquid. New Rem., July, 1877, p. 199.

Siphon Regulator for Continuous Filtration.—A new contrivance (Fig. 15) for continuous filtration has been constructed by Yvon. The vessel containing the liquid to be filtered is placed at a proper elevation over the filter, a rubber tube is made to dip with one end to the bottom of the liquid, and the other end is slipped over the short glass tube fastened upright in a retort stand, and terminating in a point, shown in the illustration. A metallic band attached to the tube carries a piece of cork, which closes the orifice of the glass tube and turns downward on a hinge whenever the liquid in the filter ceases to press it upward against the glass tube. This valve, however, is made more delicate by a metallic globe, movable on a lateral screw-rod, and attached to the back of the valve. By means of it the cork-valve can be made to

FIG. 15.

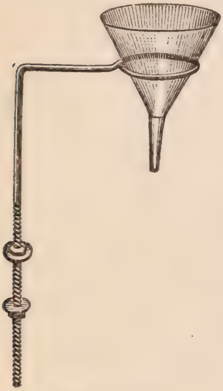


Siphon Regulator.

press upward more or less strongly, depending upon the height of the liquid in the upper receiver. New Rem., Sept. 1877, p. 264.

A Convenient Filter-stand.—A correspondent of "New Rem." (Oct. 1877, p. 301), sends a description of a convenient filter-stand (Fig. 16), which he has for some time had in his laboratory, and finds it to be practically useful. A ⅜ inch iron rod four feet in length is bent at its middle to a right angle. One end of the rod is made into a ring to receive the funnel, care being taken to have the ring at a sufficient distance from the angle to accommodate the receiving vessel. A thread is cut on about a foot of the other end of the rod, and furnished with two nuts and a couple of washers, by means of which the rod is fastened, through properly bored holes, to any desired position on the work-table.

Fig. 16.

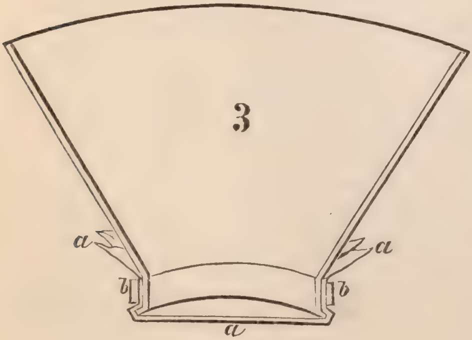


Filter-stand.

Strainers. — G. Christel recommends strainers of porcelain as preferable in every respect to those of linen, or any other similar fabric, for strainging vegetable infusions, decoctions, etc. The linen fibre, etc., has a strong affinity for certain extractive and coloring matters, and these are often removed, but incompletely, by washing. Moreover the use of porcelain strainers is more cleanly; the hands need not come in contact with the extracted substance, which may be pressed out by the aid of a pestle. Arch. Ph., Aug. 1878, p. 141.

A Simple Strainer.—C. A. Müller has constructed and recommends the strainer illustrated by Fig. 17. It is made of pewter, the upper orifice being 13 to 15 ctm., the lower 6 to 7 ctm. wide, and provided with a cylindrical extension about 1 ctm. long, and slightly bent outward at the extreme edge. When using this, a straining cloth, *a*, is stretched over the nar-

Fig. 17.



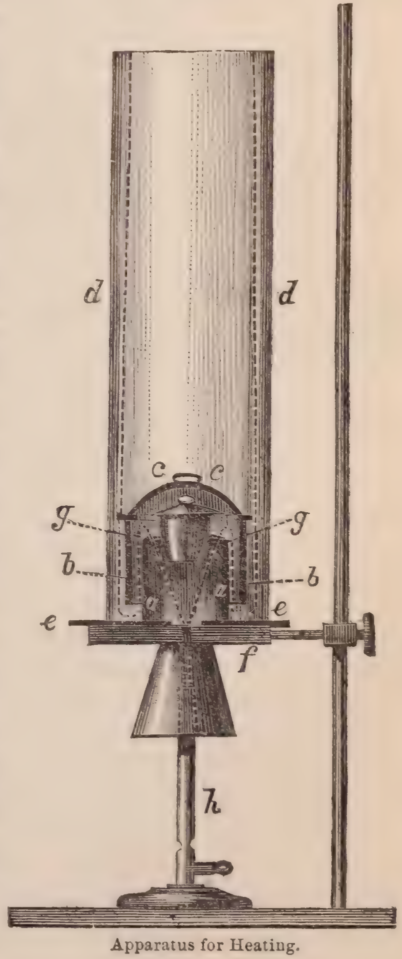
Strainer.

rower orifice and is held in its place by means of the rubber-band, *b*. Arch. Ph., April, 1878, p. 342.

APPLICATION OF HEAT, VAPORIZATION.

A simple Apparatus for producing an intense heat has been devised by Dr. Walther Hempel, and is mainly composed of clay cylinders and sheet iron, by means of which a common Bunsen's burner may be made to do the work of a muffle or blast lamp. The gas oven (see Fig. 18), consists of two clay cylinders, *a* and *b*, an arched clay cover, *c*, a plate of sheet iron, *e*, with a central hole, and a sheet iron chimney, *d*. An ordinary retort-stand answers very well for supporting the apparatus. The inner and smaller clay cylinder has, at its upper margin, three projecting arms for holding the crucible; the larger cylinder rests on the sheet-iron plate only by three points, the intervening space serving as an exit for the gases. The chimney and the clay cylinders are retained in their proper places by small guides, made of strips of sheet iron, riveted to the bottom plate. When the apparatus is to be used, the height of the ring, *f*, of the retort stand is regulated so that the hottest part of the flame from the Bunsen's burner, *h*, will strike the middle of the crucible. The flame is then turned low, the crucible introduced, and the cover and chimney set up. After two or three minutes the interior has become sufficiently hot to permit the flame

Fig. 18.

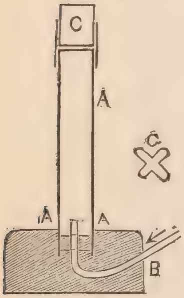


Apparatus for Heating.

being turned on full, when it follows the direction of the dotted lines. The author states that he finds it to be a serviceable substitute for a muffle in nearly all cases. As an instance, he adds that he has melted with it some 50 grams of silver in a small porcelain crucible. New Rem., 1877, p. 332, from Zeitsch. f. Anal. Ch. 1877.

A Simple Bunsen's Burner.—Dr. P. Ebell constructs an inexpensive Bunsen's burner, superior to metallic burners for observing flame reactions, as follows: In a piece of combustion tubing, about 10–12 cm. long, two openings, *a*, *a* (Fig. 19), are blown, the edges being melted smooth in the flame. Into the lower end is introduced, by means of a cork, the curved glass tube, *B*, the inside end of which is softened in the flame and formed in the shape indicated at *B*. The whole is held upright by being imbedded in a foot-piece made of plaster or cement, which may be painted black, and then covered with shellac varnish. Since the upper part of the tube, by repeated heating and cooling, would acquire a tendency to crack, it is recommended to attach a shorter piece to the main tube, by means of a small rubber ring. In case of breakage, this may be replaced. New Rem., May, 1878, p. 144.

FIG. 19.

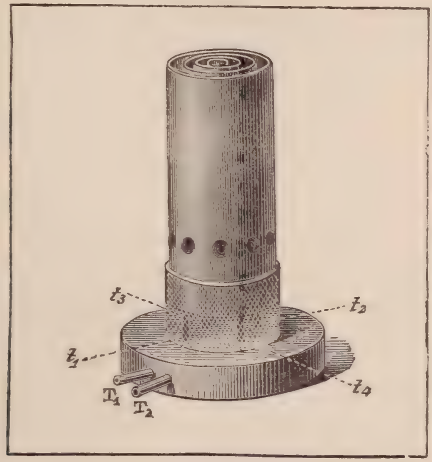


Bunsen Burner.

Godeffroy Burner.—Mr. Godeffroy's new burner, represented by the accompanying cut (Fig. 20), is composed of four concentric sheet-iron cylinders. The first and third are pierced with lateral holes at the base. The intervals between the cylinders communicate, some with the pipes, t_1 and t_2, joining the exterior gas-tube, T_1, and others with the tubes, t_3, t_4, which unite with the tube T_2. Wire gauze placed at the base of the apparatus prevents the flame from flickering, while it regulates the introduction of air. Only two internal cylinders may be used, if desired, in which case a high and regular white flame is produced. New Rem. July, 1877, p. 200; from Scient. Amer.

Blowpipe Work—Application of Aluminium Plate as a Substitute for the Charcoal Support.—The difficulty of obtaining suitable pieces of charcoal for blowpipe work, their bulky character, etc., make it very desirable that some substitute, free from these objections, should be proposed. A number of such have been proposed, but none that appeared as suitable as the *aluminium plate* described by Major Ross in his book "Pyrology." W. M. Hutchings not only finds an aluminium plate to replace the charcoal in blowpipe operations, but he finds it superior in many respects; being more portable and cleanly, less expensive, and giving in most cases much better indications of the volatile substances sought for. The only charcoal required with it is a stock of small pieces, about half an inch square and rather thicker than a penny piece, which can easily be cut ready, and, if necessary, carried in large numbers. The best aluminium for the purpose is about the thickness of a six-penny piece. A strip of such foil should be got, 5 inches long by 1½ inches wide, and one end should be turned up to form a ledge, this ledge being between ½ and ¾ inch wide, and making rather less than a right angle with the rest of the plate. Sheet-aluminium, even of much greater thickness than this, can be be bent easily without any cracking by heating it in a Bunsen burner and working it while hot. After turning up the ledge, and rounding off the edges and corners with a file, the plate should be well scoured with bone ash and polished with leather and whiting; after once polishing the new plate, all the cleaning required is done in half a minute with a bit of wash-leather and some fine-ground bone-ash and water. When in use it is best held with the spring-forceps

FIG. 20.



Godeffroy Burner.

described by Ross, though other forceps can be made to serve the purpose, the handles being covered with felt or flannel, as they get very hot.

Such a plate will cost about 3s. 6d., and will last any length of time. The blowpipe flame does it no injury (not even a good powerful one worked by a small hand-blower), and there is scarcely any substance which may not be heated directly upon it with perfect safety. The one side being kept for sublimates, the other may be used for such purposes as calcining sulphides, etc., before testing in beads, for which it is far superior to charcoal, especially in the case of very fusible minerals.

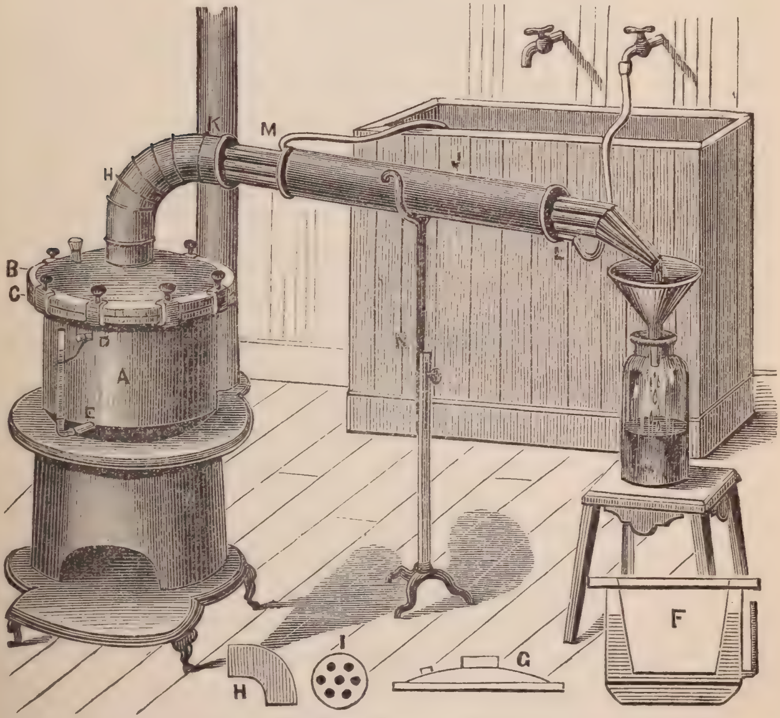
The author gives some concise directions of the best way to use the platinum plate, and also examples of its application for obtaining sublimates from arsenic, antimony, lead, lead with antimony, bismuth, cadmium, zinc, molybdenum, thallium, selenium, silver, and gold. Ch. News, Nov. 9 and 16, pp. 208 and 217.

A Cheap Gas Blowpipe.—Frederick Bente proposes the following: An ordinary gas blowpipe is connected with a bottle of about 5 liters capacity, provided with a cork with two holes. Through one hole, passes a siphon-shaped tube, terminating inside the bottle in a Bunsen's valve, and connected outside with an ordinary india-rubber bellows. Through the other hole a tube passes directly from the gaspipe of the lamp. A very constant pressure can thus be kept up, and a very high temperature attained. The cost of the apparatus may be greatly reduced by using an india-rubber ball with a lateral aperture, which is closed with the thumb before squeezing the ball. This form, however, is not so convenient for glass-blowing. J. Chem. Soc., Sept. 1877, p. 275, fr. Ber. d. Deut. Ch. Ger.

Porcelain Capsules.—G. Christel finds that the expensive porcelain capsules used in laboratories may, for most purposes, be substituted advantageously by the ordinary crockery vessels of the chinaware shops. The glaze on some of the latter is superior to that on most of the ordinary porcelain vessels, and while they cannot be used for operations requiring the application of direct heat, they will answer well for making certain ferric and other compounds which readily stain or attack the porcelain laboratory ware commonly found. Moreover, the crockery ware can always readily be obtained, while the porcelain ware is not always obtainable in suitable sizes. Arch. Ph., Aug. 1877, p. 139.

New Distillatory Apparatus.—Prof. Jos. P. Remington has constructed a new distillatory apparatus, which he recommends as compact, easily kept in a proper condition, suitable for nearly all the ordinary processes requiring distillation in the pharmaceutic laboratory, and as cheap as is consistent with utility and convenience of application. The apparatus is illustrated by Fig. 21. The still proper, *A*, thirteen inches in diameter, may be constructed of copper, and if a copper case, in which oil of lemon, bergamot, etc., are imported, can be procured, a new bottom may be brazed into it by a coppersmith, and the whole tinned inside; the top is cut off, and two flat brass rings, *B* and *C*, one and a half inches wide, and half inch thick, are soldered or riveted to the top and body of the can, as shown in the cut; two short half-inch copper tubes, *D* and *E*, are fastened to the body of the still, communicating with the inside for use as a

FIG. 21.

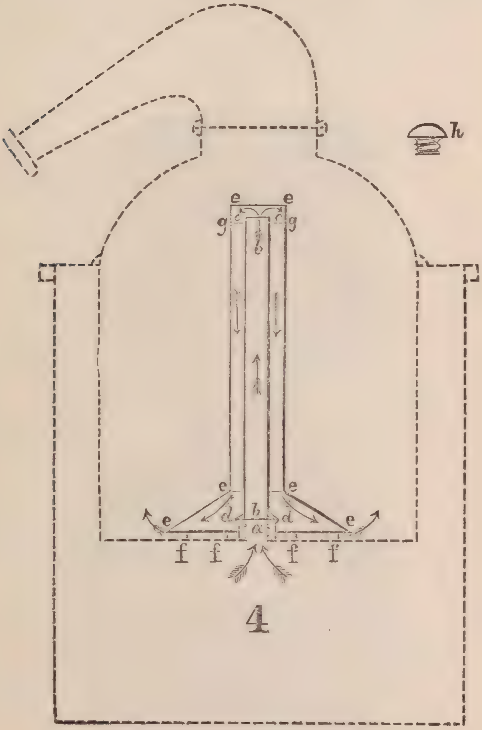


Distillatory Apparatus.

water-level; a glass tube, bent at right angles at top and bottom, is fastened by two short pieces of rubber tube to the copper tubes for this purpose. When the water-bath is used, described below, the upper end of the glass tube is drawn out of the rubber tube, in order to afford egress for steam through the upper tube, *D*. A three-quarter inch copper tube is led into the top to supply the liquid to be distilled. A water-bath of tinned copper or tinned iron of the shape shown in *F*, with a flat rim, which accurately fits the flat brass ring, shall be provided. A four-inch opening is made in the copper top, G, to which is fitted the elbow, H. This elbow is best made of tinned copper, but may be replaced by a tinned iron "lobster back," gutter-pipe elbow, if first cost is a consideration. The condenser, *J*, however, is the most important part of the apparatus, and consists of seven tubes, one inch in diameter, and thirty-two inches long, surrounded by a cylinder, five inches in diameter and twenty-four inches long. The seven tubes are arranged, as seen in the sectional view, *I*. A cap, *K*, two inches deep, soldered to the condenser, fits tightly over the elbow, *H*, so that a tight joint is made here. A short tube, *L*, at the bottom of the condenser, is connected with a rubber tube from the hydrant, and a similar tube at *M* conveys the heated water into the sink. The ends of the condenser tubes are drawn together and tapered, so that a bottle with an inch and a half mouth may be used for collecting the distillate. An iron stand, *N*, adjusted by raising or lowering the U-shaped support, and fastening at any required angle by means of a screw in the centre, complete the apparatus. The joint between the still and dome is best made by inserting a wetted hempen cord (the thick twine which is used by the paper manufacturers to bundle reams of wrapping paper answers very well) between the brass rims, and clamping together, as shown in the figure. A. J. Ph., Jan. 1878, p. 15.

Pharmaceutical Still.—Improved steam-supply pipe. The steam-supply pipe attached to the pewter stills, commonly in use in the German laboratories (in Beindorff's apparatus, etc.), have the objection that it is generally difficult to secure a perfectly tight joint. C. A. Müller suggests the improvement illustrated in Fig. 22. Upon an opening in the bottom of the still a short tube, *b b*, is attached by the aid of the screw-thread, *a*. The tube is open at both ends, and the connection is made perfectly tight by means of the rubber washer, *d d*. At the upper extremity three rods, *c c*, are attached horizontally, and these are surrounded by the ring, *g g*. Over the whole a cylinder tube, *e e e e*, closed at the top, and spreading out in funnel-shape below, is placed; the funnel being provided with several feet, *f f f*, constructed by cutting out a portion of its extreme edge, and bending the remaining portions suitably, thus securing the free circulation of steam from the boiler beneath, the current of which is indicated by the arrows. When a direct current of steam is not desired the tube and hood are removed, and the knob, *h*, is screwed into the opening *a*, and rendered tight by the aid of the rubber packing. Arch. Ph., April, 1878, p. 343.

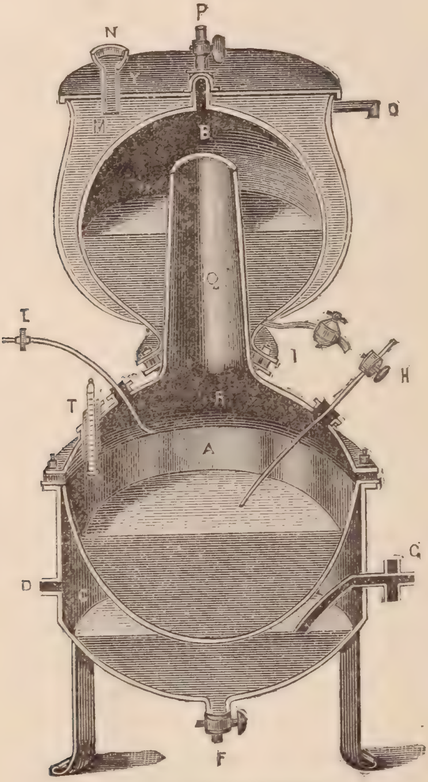
FIG. 22.



Pharmaceutical Still. Steam Injector.

Lentz's Vacuum Apparatus.—The apparatus illustrated by Fig. 23 is designed by Lentz, and is much used in German pharmaceutical laboratories for the distillation of alcoholic liquids at two temperatures. It is mainly constructed of sheet copper, of a thickness of about 25 mm. The flanges and the three legs upon which it stands are made of iron; the packing between the flanges consists of rubber. The steam chamber, D, C, F, has three openings; G being the steam inlet, D the outlet, and F, a stop-cock for drawing off the excess of condensed water. Into this steam jacket is placed the tinned copper boiler, A, which receives the charge of the liquid to be distilled. The whole is surmounted by the still head, Q, R, and the three flanges are made tight at the same time by the rubber packing. The head has several tubulures, T

Fig. 23.

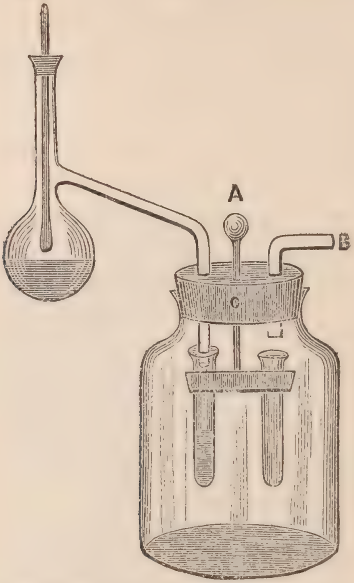


Lentz's Vacuum Apparatus.

being intended to receive a thermometer, L a small steam-pipe for expelling the atmospheric air contained within, by means of a jet of steam, and H being a tube for refilling the boiler, A, with fresh portions of the liquid. Upon two nearly opposite sides of the head two small windows are fitted, by means of which the process of evaporation may be watched. This is best done by holding a bright light, guarded by a screen, over one window, and looking down through the other. The still head is further surmounted by the condensing vessel, B, which is joined, water-tight, to the head by means of the flanges at the neck. This condenser is a double-walled copper vessel, provided with four openings, P and I, passing entirely through both walls of the vessel and communicating with the interior, while N and O are the inlet, respectively, of the condensing water. Whenever the amount of condensed alcohol, etc., surrounding the upright still head requires removal the faucet at P, is opened to admit air, and the liquid drawn off at I. When using the apparatus the various parts are joined together, as shown in the figure, the faucet, P, is opened, and sufficient charge run into the boiler, A, by means of the tube, H. Steam is now turned on, at G, and as soon as the thermometer indicates a temperature of 60° C. (= 140° F.), a jet of steam is injected over the surface of the liquid in the boiler, through the pipe, L, until steam escapes briskly at P. This causes the removal of atmospheric air within the apparatus; but the same effect may be produced by connecting the faucet, P, with a good air-pump. All openings having been closed, cold water is passed into the condenser, and the steam, at G, being kept up, rapid condensation of the volatile vapors, at a reduced pressure and temperature, takes place. When a new charge is to be introduced the condensing water is allowed to run off, and the apparatus filled, exhausted of air, and heated again in the same manner as before. N. Rem., May, 1878, p. 136.

Apparatus for Fractional Distillation Under Diminished Pressure.—E. J. Bevan has devised the apparatus illustrated by Fig. 24, which appears admirably adapted to the purpose indicated by this heading. The figure needs no explanation beyond stating that by means of the rod, A, moving, air-tight, in the cork, C, any of the tubes which it carries below may be brought under the delivery tube of the fractionating flask. The apparatus is connected at B, with an exhausting pump. Ch. News, May 3d, 1878, p. 183.

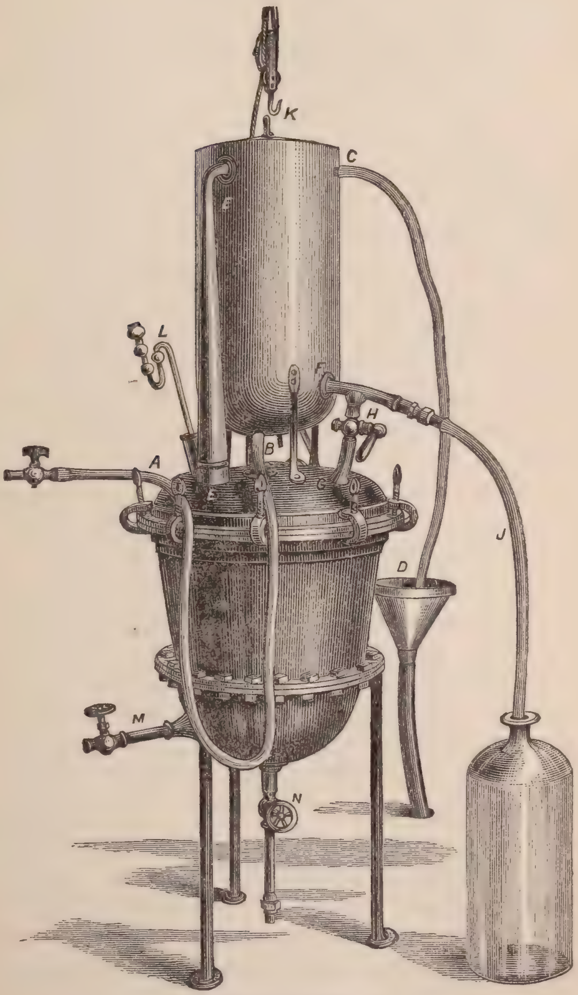
FIG. 24.



Apparatus for Fractional Distillation.

An Improved Condenser.—The following admirable arrangement (Fig. 25), has been devised and is used by Mr. Charles Rice. Its compactness and general utility will at once recommend itself to the pharmacist for general laboratory work, attended with the distillation or recovery of alcohol, etc. It consists mainly of two parts: the still and the head, with condenser. The still has a capacity of sixteen gallons, and is heated by steam, which enters at *M*, *N* being the exhaust-pipe. The still-head is constructed of tolerably heavy copper, to be able to bear the condenser, which is fastened to it by three iron legs, attached with rivets. The condenser is a cylindrical copper vessel, of the capacity of about ten gallons, with rounded bottom and closed top, having short half inch tubes projecting from the bottom and from the top, at *B* and *C*. There are two such tubes at the bottom, one for attaching the rubber hose, *A*, bringing the water; the other, shown in the cut, immediately alongside the letter *B*, is closed with a cork, and is used to permit the water to be emptied without detaching the hose from the other. At the top there are likewise two tubes, one at *C*, for attaching the rubber hose to carry off the water into the waste-pipe, *D;* the other, being closed by a cork, is not shown in the cut, as it is on the back of the condenser. The head of the still carries three short tubulures, only one of which is visible in the cut, and which contains a cork

FIG. 25.



Improved Condenser.

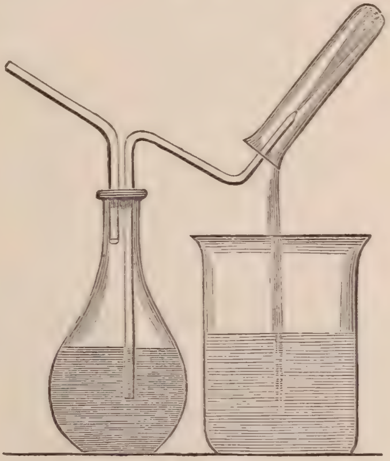
bearing the safety-valve, *L*. Another opening is at the other side, for refilling the still when required; and still another narrower tube, intended for the insertion of a thermometer. The condensing-pipe begins at *E*, where it rises from the head, parallel with the condenser. It is made of copper as far as the point indicated by the upper, *E*, where it is soldered to the *downward projecting* upper end of the block-tin worm contained in the condenser and emerging from it at *F*. This arrangement makes it impossible for any condensed liquid to come in contact with anything but block-tin. The worm, inside the condenser, is made by carefully winding upon a round block of wood twenty feet of three-quarter inch block-tin pipe, taking particular care that the coil has a uniform downward descent throughout. After emerging from the condenser at *F*, it extends for a short distance, where the cut shows it to be connected with the separate block-tin pipe, *J*, by means of a union joint lined with tin. Half-way between *F* and the end proper of the worm, the pipe is tapped, and a branch carrying the faucet, *H*, leads into the still, at *G*, where it terminates under the centre of the head, in the form of an ∽ , forming a trap to prevent the escape of vapor by this passage. The object of this arrangement is to cause the condensed liquid to flow back into the still as long as the faucet, *H*, is open, or to collect it outside by turning off the faucet, *H*. Prolonged digestions with alcohol may be made by means of this apparatus, without any loss of liquid. The head is attached to the still by means of a rubber washer and iron clamps, and when it is desired to remove it the water is allowed to drain from the condenser, the clamps are removed, and the whole is hoisted up by the tackle, *K*, and set on one side. When using the apparatus for digestion, the author is in the habit of placing in the still two gallons of ordinary glycerin, and into this a large porcelain pot, supported in such a manner that the glycerin surrounds it on all sides, up to within about four inches of the top. The liquid to be distilled is placed in the dish, the distillate, if required to be used as a continuous menstruum, is made to run back into the still, where it flows into the dish, etc. The apparatus is *not* patented. It may be obtained at reasonable prices and of superior workmanship, of John H. Heynan & Co., 246 Water St., New York. New Rem., Aug. 1877, p. 245.

GENERAL LABORATORY OPERATIONS.

Equipment and Working of a Small Pharmaceutical Laboratory.—G. F. Schacht gives his experience in the equipment and working of a small pharmaceutical laboratory, in a paper read before the British Pharm. Conf. The paper is illustrated by four cleverly-executed drawings, and will be studied with interest and profit by pharmacists generally. Yearbook of Ph., 1877, p. 550–558. See also N. Rem., Oct. 1877, p. 295–298.

Improved Wash-bottle.—E. H. Johnson recommends the wash-bottle, illustrated by Fig. 26, as extremely useful in washing precipitates, etc., from test-tubes, beakers, etc. The improvement consists simply in bending up the jet end of the tube at about an inch and a half from the extremity; so that while the bottle is held in the ordinary upright position, a vertical jet of water can be directed into a test-tube inverted over a beaker, etc., to receive the washings. Ch. News, Sept. 14th, 1877, p. 119.

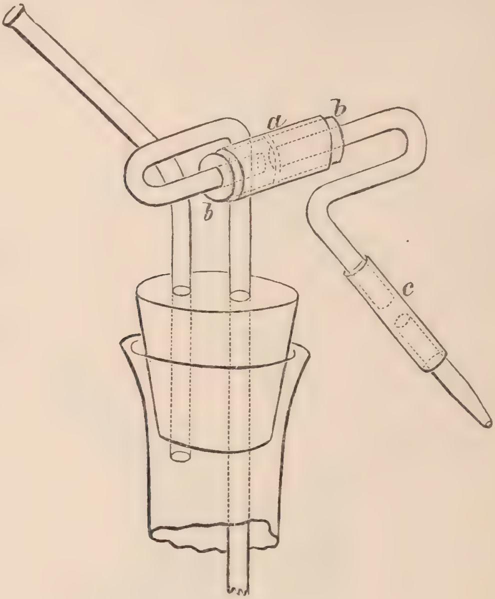
FIG. 26.



Wash-bottle.

Charles O. Trechmann draws attention to a more universally useful jet for a wash-bottle than the above, which, he states, is in general use in Prof. Bunsen's laboratory in Heidelberg, and is also figured in Prof. Thorpe's "Quantitative Analysis." It is illustrated by Fig. 27. *A*, represents a piece of slant glass tube; *b b*, are the corks; and *c*, a piece of india-rubber tube. One finger suffices to guide the jet in all directions, and the arrangement is not liable to get out of order. Ch. News, Oct. 5th, 1877, p. 165.

FIG. 27.



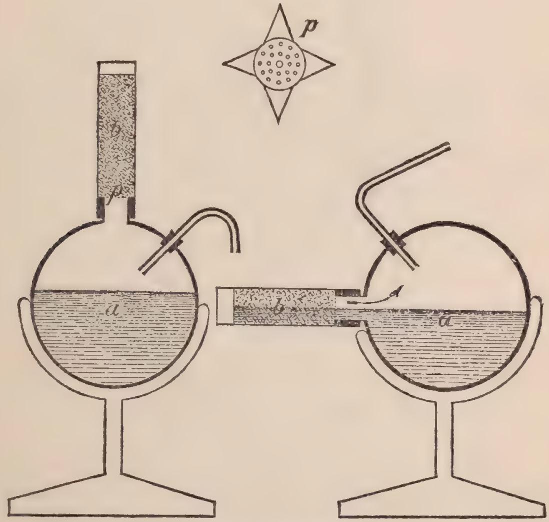
Jet for Wash-bottle.

Instead of the before described arrangement, C. J. Woodward has used a movable jet, which enables the operator to direct a stream in any required direction. The jet is attached to the tube by a piece of india-rubber tubing, a sufficient space being left between the two tubes for the jet to play about in any direction. A strip of sheet lead, somewhat longer than the india-rubber tube, and about one-eighth of an inch broad, is tied on, and thus arranged the jet may be turned about, and the strip of lead retains it in whatever position it is placed. It is advantageous to fasten the lead near the jet with a band, as this can easily be slipped off if it is desired to use the jet without the lead attachment. Ibid., Jan. 18th, 1878, p. 23.

Felt Pads for Protecting Glass Vessels.—P. Townsend Austen, after trying various means of preventing glass vessels from breaking by the ordinary handling they are subjected to in the laboratory, recommends felt pads, made from ordinary roofing felt, cut into suitable pieces, for this purpose. A beaker filled with a hot liquid—boiling sulphuric acid, for instance—may be placed with perfect safety on one of these pads. The felt is a very poor conductor of heat, and the glass hence preserves its temper admirably. Neither is there enough resistance offered to the glass surface to allow it to be scratched by any grains of sand which may perchance be on the felt. The softness of the felt removes all chance of breakage. Ch. News, August 3d, 1877, p. 49.

A Simple Gas Generator.—A very simple apparatus, for generating gases, has been constructed by Max Süss, which is represented by Fig. 28. The vessel, *a*, is an ordinary globular receiver, of the capacity of 300–500 cc., and intended to contain the acid. The upper vessel, *b*, which is to be charged with marble, zinc, ferrous sulphide, etc., according to the nature of the gas to be generated, is a cylindrical vessel, turned bottom upwards, and pushed over a cork ring surrounding the neck of *a*, light enough to prevent leakage. The solid contents of *b* are retained in it by means of a diaphragm of platinum or lead, *p*, which may be fastened upon the edge of the cork ring by means of the four

FIG. 28.

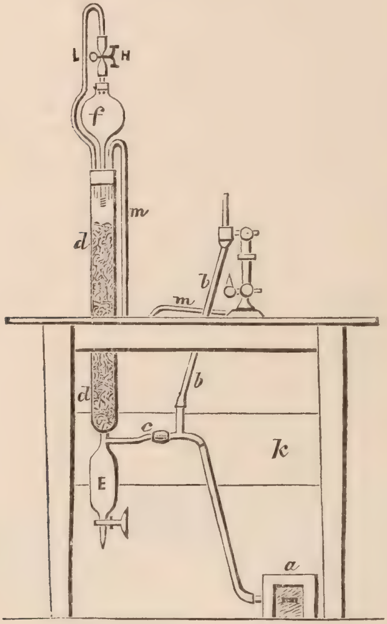


Gas Generator.

sharp corners. When using the apparatus it is only necessary to turn the vessel *a* sufficiently, to cause the acid to enter the vessel *b*. New Rem., Nov. 1877, p. 331; from Zeitsch. f. Anal. Ch.

Gas Generator for use in connection with a Blow-pipe.—Alexander C. Thomson proposes a gas generator (Fig. 29), for use in connection with a blow-pipe, which may prove very serviceable in laboratories not supplied with gas; *a*, is an ordinary foot-bellows; *b*, branch tube for supplying air to blow-pipe; *c*, air-tube leading into ditto; *d*, wide glass tube filled with pumicestone; *f*, reservoir containing a light liquid, hydrocarbon, the lower tube being drawn to a point and stuffed with a little sponge to allow discharge only by drops into *d*; *H*, clip for stopping discharge of liquid; *L*, tube to equalize pressures on both surfaces of liquid; *E*, reservoir to catch excess of liquid; *M*, tube leading off air charged with inflammable vapor; *K*, wooden support fixed to table. A light mineral naphtha from the coke-towers of par-

FIG. 29.

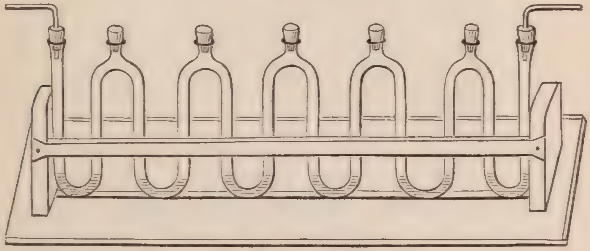


Gas Generator with Blow-pipe.

affine oil works is exceptionally suitable as a source of gas. Chem. News, August 31st, 1877, p. 77.

A New Form of Gas Absorber is recommended by G. Gore, and is illustrated by Fig. 30. By the single passage of a bubble or stream of gas through a liquid, the former touches only to a small extent the latter, and requires to be passed through several portions of the liquid before it is completely absorbed or purified. When either Woulff's bottles or bent glass tubes are employed for the purpose, in the former case a considerable bulk of liquid must be used, and in both cases a number of junctions must be made with the different parts of the apparatus, and a proportionate risk of leakage incurred. In the apparatus constructed by the author, gases may be quickly washed or small quantities of liquid rapidly saturated, and it is otherwise free from the objections named. It consists of a single glass tube, of about half an inch external diameter, bent into a series of four or six double curves, the upper part of each of which is provided with a neck (and closed by a rubber stopper), so that each limb of the tube may be readily cleaned. The tube is supported and kept steady in the manner shown in the sketch. Ch. News, April 26th, 1878, p. 165.

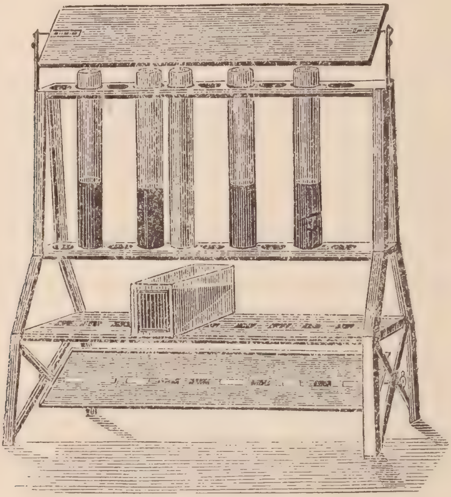
FIG. 30.



Gas Absorber.

Color-Comparator.—There are numerous chemical operations in which it is required to estimate the amounts of substances in solution by the relative depth of tint of a certain color. Prof. Albert R. Leeds has devised an apparatus for this purpose (Fig. 31), which avoids the considerable instrumental complication in the way of lenses, graduation, rack and pinion movements, etc., usually resorted to, and gives very satisfactory results. Moreover, it admits of the examination and comparison of a large number of liquids at the same time. It is a sack, about 16 inches wide, and of about the same height. The materials employed have been tin, sheet-brass, or, in the latest and most perfect forms, of a combination of iron and brass castings. It is arranged to hold 10 comparison tubes, each of which, when filled to the same depth (6 inches), contain precisely 100 cc. An adjustable mirror reflects the light downward, through these comparison tubes, and the light, after passing through slits (¾ of an inch long and ¼ inch wide), cut in a stage beneath, is reflected outward to the eye by a similar adjustable mirror. In the apparatus figured the supports of the upper mirror are placed at the front corners, so as to make the axis of the mirror in front of the upper row of holes, and permit the tubes to be lowered into their places from the top. Later it was found more convenient to slip the tubes in from below, which can be done without rising from one's seat, and in this case the axis was put directly over the centres of the line of holes, and the mirror made somewhat narrower (3 inches). A black cloth, not shown, hung from the back upper corners, prevents any light reaching the eye, except that reflected from the lower mirror. The comparison is effected by a prism nearly filled with a suitably colored liquid. The prism is constructed by cementing within four straight walls of plate-glass the in-

FIG. 31.



Color-Comparator.

clined top and bottom sides of the prism. It is 10 inches long, 1½ inches wide, 2¾ inches at the base of the prism, narrowing to 3-16th inch at the apex. The prism is cut off in this manner at the apex, because when filled with liquid of the most suitable intensity of color, the gradations beyond this point are too inconsiderable to be of value. The liquid is introduced through an orifice in the base, over which is afterwards cemented a glass cover.

In making the comparisons, the prism may be lifted either to the right or left directly upon the stage, or placed upon a second movable stage, which rests upon the former and acts as a carriage. The prism is then moved out or in until the requisite shade of color is arrived at. Considerable difficulty is experienced in purchasing comparison tubes of uniform diameter. It is hoped that such can be moulded, with flat bottoms, which will prove satisfactory. The author gives several examples illustrating the application of the comparator. Chem. News., June 7th, 1878, p. 229.

Tinctorial Power of some Pharmacopœial (*Br.*) *Preparations.*—W. Gilmour draws attention to a method by which the relative tinctorial power of tinctures, etc., of different strengths, may be ascertained. The method depends upon the transmission of light through solutions of known strengths and reducing to degrees for purposes of comparison. He accomplishes this by the simple adaptation of the spectroscope in which the spider-web micrometer is brought to the exact point of complete absorption of light, when the amount transmitted can easily be calculated. By this means differences in tinctorial power can be readily observed which are not observable by the unaided eye, and it is astonishing how great these differences may be. A marked difference in the power to transmit light between alcoholic and aqueous solutions of the same substance—*e. g.* iodine—and of the same strength, also appear to exist. Ph. J. Trans., Sept. 8th, 1877, p. 181.

Quantitative Spectral Analysis, and a New Spectro-Photometer.—G. Hüfner has prepared a somewhat complicated apparatus for the application of the spectroscope to quantitative analysis, based on the most elaborate physical and physiological observations. The essential principle is the use of a Nicol's prism, through which passes a ray of light which has traversed the medium to be analyzed. The arrangement allows of the comparison of this ray with one passing through a normal solution, and by revolving the prism the light of the brighter ray is reduced to the same degree as that of its companion. The angle described by the revolving prism gives, then, the difference in the two liquids, which are placed otherwise under the same conditions as to quantity, sources of light, etc. Experiments showed a probable error of 0.83 per cent. in the various determinations.

Forensic Analysis.—Prof. Dragendorff has made some experiments with a view to determining whether his method—which, as is now well known, is based upon the extraction of poisonous substances from their aqueous solutions by some liquid, not mixible with water, and having a stronger affinity for the substance sought than water—is applicable to certain substances recently introduced into therapeutics. His results are given in the following:

1. *Salicylic acid.* This is extracted from its aqueous solutions, acidified with sulphuric acid, by petroleum-ether; but benzol, or chloroform, extract it with still greater facility.

2. *Gelsemium sempervirens.* The properly prepared aqueous extraction, when *acidulated* with sulphuric acid, yields to chloroform a substance which is redissolved by boiling water, and communicates to such solution, particularly on the addition of solution of soda, a distinct blue fluorescence. From the *alkaline* aqueous liquid, petroleum ether extracts none, or but a trace of gelsemia, but benzol or chloroform remove it abundantly.

3. *Jaborandi.* From *acid* aqueous extractions, petroleum benzol, or chloroform, extract only traces of volatile oil, but no alkaloid; from *alkaline* aqueous solutions, petroleum ether also fails to extract the alkaloid, but benzol and chloroform extract the pilocarpia very readily.

4. *Taxus baccata.* The alkaloid, taxia, is not removed from *acid* aqueous solutions by either petroleum ether or by benzol, but chloroform takes up traces; from the *ammoniacal* liquid, petroleum ether only dissolves traces, while benzol or chloroform removes it readily.

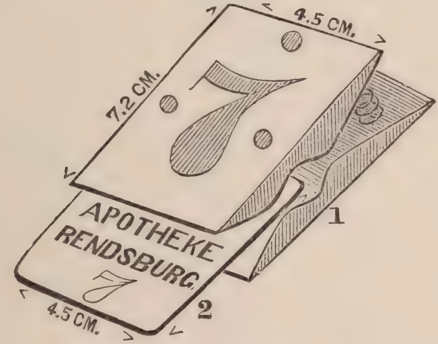
DISPENSING.

Dispensing Prescriptions.—Andrew Blair makes some practical suggestions on dispensing prescriptions in general, and particularly on proper precautions whereby inaccuracies in receiving and delivering prescriptions may be prevented. He suggests, that when receiving a new prescription from a customer, the following memorandum be put on the back of it:

The name of the person for whom it is; state if waiting, or to be sent, or to be called for; if to be sent, give the address; if to be called for, state the time; if paid for, or to be collected, or to be charged. If the prescription is an old one, to be repeated, the memorandums are put on a blank form, and handed in to the prescription department. A. J. Ph., Oct. 1877, p. 498.

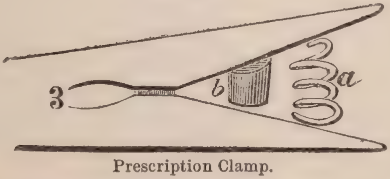
Prescription Clamps.—Referring to Mr. Blair's paper, H. E. Schelenz, of Rendsburg, Germany, draws attention to a little apparatus, which he had described about a year ago in the "Pharmaceutische Zeitung," and which has found great favor in Germany, for the purpose intended to be covered by Mr. Blair's suggestion. The little apparatus will be easily understood from the accompanying sketch (Fig. 32). These prescription clamps (1), are marked with a large figure, and if not in use, contain a check with the same figure and with the name of the firm, as shown in cut (2). The checks are made of sheet-iron, with the figure and firm engraved thereon. The clamp works by means of two spiral springs (3 *a*), between which is placed a piece of

FIG. 32.



Prescription Clamp.

FIG. 32 *a*.



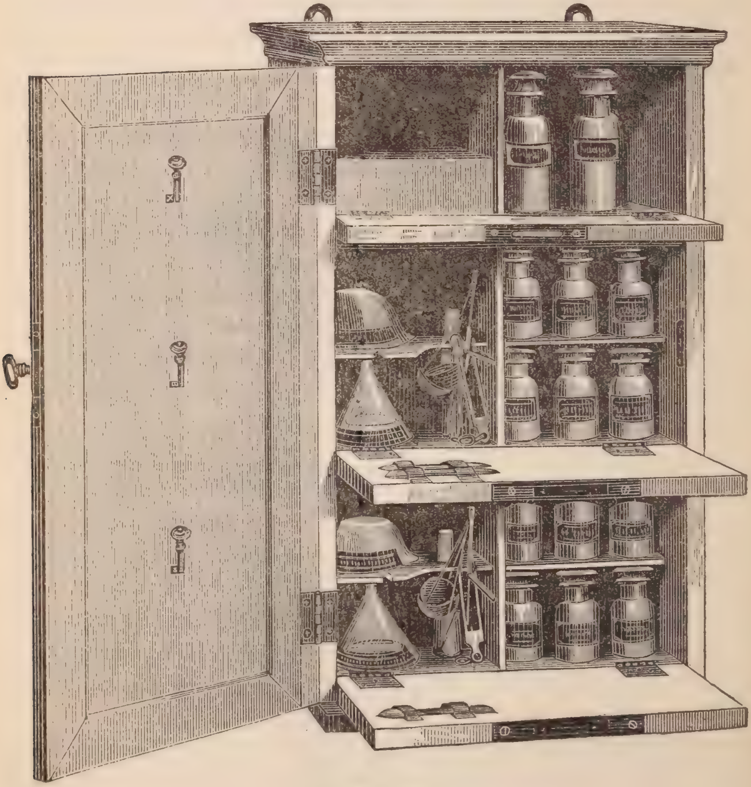
Prescription Clamp.

cork (3 *b*), to prevent too strong a pressure. A person coming with a prescription receives a check, and the prescription is placed in the corresponding clamp. If the medicine is called for, the check is demanded, and in this way mistakes are prevented and much unnecessary questioning avoided. Remarks like "paid," "half the quantity," etc., are written upon the prescription, a corner of which is bent for the purpose. A. J. Ph., Feb. 1878, p. 66.

In the same number of the Journal, X. Y. Z. draws attention to the dispensing of certain dangerous compounds.

An Improved Poison Closet.—Holbe, an apothecary of Berlin, has constructed a new poison cupboard, which was primarily designed to comply with all the requirements of the German drug and poison laws, but which deserves to be adopted any-

FIG. 33.



Poison Closet.

where, even without government coercion. The accompanying illustration (Fig. 33) shows the interior. Each set of poisons is separate by itself. The outer door being unlocked, it still requires a key to get at the particular poison wanted, thereby intensifying the attention of the person opening it. Separate scales, spatulas, and mixing vessels are kept in each compartment. It is kept for sale, ready made, by Warmbrun, Quilitz & Co., Berlin. New Rem., Dec. 1877, p. 367; from Arch. d. Ph., Oct. 1877.

Dose-Dispensing Simplified.—Dr. R. M. Fuller, of New York, proposes the dosing of medicines in the form of *soluble tablets*, *tablet triturates*, *pill saturates*, and *tablet saturates*, all of which are described, together with the apparatus employed in their preparation, in New Rem., March, 1878, p. 69–91.

Explosive Bodies and Mixtures.—Charles Rile contributes a paper, in which the various explosive bodies and mixtures are enumerated. The paper also embraces a list of such substances as are spontaneously inflammable, although not directly explosive. The author has evidently given the subject very thorough attention, and his contribution will be found of great service, not only to the younger members of the profession—to whom he specially addresses his remarks—but to the profession generally; in New Rem., June, 1878, p. 165.

Arsenical Capping Paper.—J. B. Barnes draws attention to a magenta-colored capping paper, in use in England, which contains arsenic to a large extent. The color of the paper is evidently the product of the oxidation of anilin by arsenic acid; it is very soluble, and the author has seen an imperfectly corked bottle of medicine, which had been capped with this paper, colored pink by its means. The paper in question is rose-colored, has a smooth surface, and is very nice to use, being strong, thin, and pliable, but it loses its brilliancy when exposed to the light; it is on that account alone not the best which can be selected for the purpose, even if it did not contain a deadly poison. Ph. J. Trans., Oct. 27, 1877, p. 327.

Starch Paste, or Mucilage for tinned iron surfaces, is usually recommended to be made with the addition of a little ammonia, glycerin, or tartaric acid. Sulphate of alumina (not alum) has since been used with great success; but the addition of antimonious chloride (butter of antimony), in the proportion of 20 drops to 83 of paste, is found to be still better. New Rem., April, 1878, p. 128.

B. PREPARATIONS.

ACETA.

Antiseptic Vinegar.—The following formula for antiseptic vinegar is given by Pennès. Salicylic acid, 300 p.; acetate of alumina, 300 p.; tinct. of eucalyptus globulus, 1000 p.; tinct. of verbena, 900 p.; tinct. of lavender, 1000 p.; tinct. of benzin, 100 p.; acetic acid, "No. 8," 1000 p.; mix thoroughly with the requisite precautions, shake frequently during two or three days, and filter. This vinegar may be used either pure or diluted as a lotion. Five liters injected into the carotid will preserve a cadaver several months. In the form of spray it is recommended as an admirable disinfectant for the sick-room. New Rem., Sep. 1877, p. 254.

AQUÆ.

Aqua fontana.—C. Bermbeck draws attention to the occasional trouble that may be occasioned by the use of well-water in prescriptions. The following prescriptions had been prepared by an apothecary: 1st. ℞. chinin. sulfur. 0.5, mixture sulph. acida, 1.0, ag. fontana 180.0, syrup rubiidaci 20.0. 2d. ℞. mixture sulfur. acid 2.0, ag. fontana 120.0, syr. rubiidaci 20.0. In both mixtures the handsome red color was destroyed in the course of several hours, giving place to a yellowish, faint rose red fluorescent color. The reaction on examination proved to be due to the presence of nitrates in the water—introduced probably through leakage of a cistern for rain-water—which, by the action of the sulphuric acid, liberated nitric and nitrous acids, and these caused the decoloration. Arch. Ph., Aug. 1877, p. 137.

CERATA ET UNGUENTA.

Ointment of Thymol.—In view of the fact that "thymol" has recently been suggested as a more potent destroyer of worms than carbolic acid, Balmanno Squire proposes that it be tried as a remedy for ringworm. An ointment made by melting together ʒj thymol and ℥j lard, in a water-bath, and stirring until cool, is recommended as suitable and not too strong. Ph. J. Trans., Feb. 2d, 1878, p. 602.

Ung. Myristicæ Opiatum.—The following formula is given in "New Rem." (April, 1878, p. 125): Powd. opium, 1 p.; distilled water, 1 p. Rub well together, and mix well with a previously warmed mixture of fixed oil of nutmeg, 50 p.; oil of mace (vol. oil of nutmeg? Rep.), 2 p.

Mercurial Ointment.—The following method, whereby the ointment can be made in less than an hour, is given by Jules Giraud. Two hundred and fifty parts of lard are melted with 120 parts of vegetable wax, and 690 parts of mercury are melted while the mixture is still hot. After the metal is extinguished, 200 parts of olive oil are added. Chem. and Drg., Nov. 1877, p. 439.

Unguentum Hydrargyri Nitratis.—John A. Gingrich recommends purified ox marrow as the base for this ointment. The process found to answer best is the one first suggested by R. Rother, in 1871. The fat is fused, and at a moderate heat treated with one-half the nitric acid ordered by the Pharmacopœia, and after the reaction has ceased, the mercury, dissolved in the other half of the nitric acid, is added. Thus prepared, it retains its handsome color for a long time. A. J. Ph., Nov. 1877, p. 557.

Ung. Zinci Oxidi.—Walter W. Kœhler accounts for the difficulties encountered by many in preparing this ointment, by the use of the commercial oxide of zinc, which is often not as smooth and uniformly fine as it may be obtained by the pharmacist. He suggests to prepare carbonate of zinc in the usual way from sulphate of zinc and carbonate of sodium, to wash the precipitated carbonate thoroughly, and when dry, reduce it to fine powder. A suitable crucible is then heated to redness, the powder is introduced, and after some time stirred two or three times. As soon as a portion of it, when thrown into dilute acid, dissolves without effervescence, the crucible is removed, the powder cooled upon a shallow dish and preserved in well-stoppered bottles. If heated too much or too long, the oxide will be darker and gritty; when properly made it is a yellowish, very fine powder, which may be thoroughly mixed with lycopodium or powdered starch, simply by agitation and without the use of a mortar. It costs but little more than the commercial article, and may be readily made into a perfectly smooth and fine-looking ointment. Instead of lard or benzoinated lard, the author prefers a paraffine ointment, made from heavy cylinder oil, by purifying it in the manner indicated in Am. Jour. Ph., 1873, p. 534, and 1874, p. 1 (see Proceedings, 1874, p. 57). A. J. Ph., Nov. 1877, p. 551.

CHARTÆ.

Mustard Paper.—The preparation of paper sinapisms requires two indispensable conditions: 1. The employment of powdered mustard *entirely* deprived of all fatty matters. 2. The use of an adhesive liquid, which contains neither water, nor alcohol, nor resin, nor fatty matters. These conditions are observed in the following process, adopted by the Paris Pharm. Society: Powdered mustard is deprived of its fat or oil by means of bisulphide of carbon, or petroleum benzin. The adhesive liquid consists of a solution of 4 or 5 parts of caoutchouc in 100 parts of a mixture of bisulphide of carbon and petroleum benzin. By means of a plaster-spreading apparatus a uniform coat of this solution is applied to the paper. As the latter passes out from under the apparatus, a sieve containing powdered mustard is shaken over it, which latter is fixed by the adhesive coat and firmly retained after the evaporation of the volatile liquids in a warm place. The application of the powdered mustard must be properly regulated according to the speed with which the machine delivers the coated paper. The paper is cut in pieces of convenient size. New Rem., Aug. 1877, p. 254.

Transparent Gout Paper.—Tissue-paper is covered with a solution of 1 p. amber-lac and 6 p. benzoin; when dry the following is applied: Euphorbium, 30 p.; cantharides, 15 p.; stronger alcohol, 300 p.; digest three days, filter, and add Venice turpentine, resin, and pitch, of each 15 p. If necessary, this solution may be diluted with more stronger alcohol; it should be applied with a broad brush. Another formula is: Cantharides, 15 p.; euphorbium, 4 p.; strong alcohol, 240 p.; digest a few days, filter, and add pitch, 180 p.; dissolve with gentle heat, and add Venice turpentine, 6 p., and enough tar to color the mixture brown. This is spread two or three times upon tissue-paper by means of a sponge, and when dry, the back of the paper is covered with oil of lavender. New Rem., Aug. 1877, p. 254; from Pharm. Zeit.

Nitre Paper.—Dyce Duckworth recommends the inhalation of the fumes of nitre paper—prepared from the coarsest paper and painting it over several times with Friar's balsam—for the relief of bronchitis in aged and feeble persons. A piece four or five inches square is to be burned at each inhalation. Warm cordial drinks are advised as adjuvants. New Rem., June, 1878, p. 176; from "The Practitioner," May, 1878.

COLLODIUM.

Collodium Saturninum.—The following formula furnishes a somewhat turbid solution, but the collodion does not contract on drying, and forms a tough elastic coat: 10 parts of finely rasped soap-plaster are exhausted with 50 parts of ether, the solution filtered, the filter washed with ether until the filtrate amounts to 50 parts, and the latter mixed with an equal volume of collodion of double the usual strength. New Rem., April, 1878, p. 125.

ELIXIRS.

Elixir of Hops.—John H. Kinports has found the following formula to yield an agreeable preparation: Hops, ℥ij; cloves and anise, each gr. lx; cinnamon, gr. lxxx; all in fine powder, are mixed and macerated in a portion of menstruum obtained by dissolving oil of orange, fʒijss.; in alcohol and water, each f℥xij. After 24 hours the powder is firmly packed into a percolator and displaced until 24 fluid ounces have been obtained, in which ℥xij sugar are dissolved. Each fluid ounce represents 30 grains of hops, the bitter taste of which is nicely blended with the aromatics. A. J. Ph., Nov. 1877, p. 551.

Elixir of Nux Vomica.—E. J. Davidson proposes this, prepared as follows: Tincture of nux vomica, gtt. cxx; Curaçoa cordial, f℥iij; syrup of orange peel, f℥ijss.; aromatic tincture of angustura, f℥ss., mix. The last-named tincture is found by the author to disguise the disagreeable bitterness of the strychnia, and its formula will be found under "Tincturæ." A. J. Ph., Jan. 1878, p. 22.

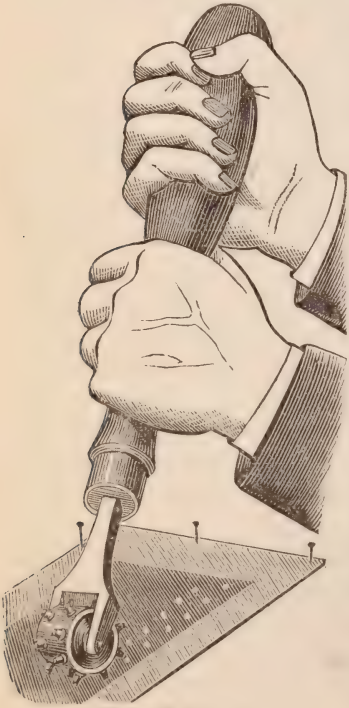
Elixir of Thuja Occidentalis.—W. H. Lawes communicates the following formula: Thuja Occidentalis, ℥xij; alcohol, glycerin, of each a sufficient quantity; percolate to 12 fluid ounces with a mixture of equal parts of alcohol and glycerin, and set aside; continue the percolation to 12 fluid ounces more, evaporate to 6 fluid ounces, mix with the first portion, and this mixture with 18 fluid ounces of simple elixir. (See Thuja occidentalis.) New Rem., Oct. 1877, p. 317.

Elixir of Monobromated Camphor Comp.—This is often precribed in Paris, and is made by dissolving butyl-chloral gr. iij, in spir. cinnamon, ʒiss.; mixing the solution with tinct. gelsemium ♏x, red elixir ʒiss; and sufficient syrup to make ℥ss., and dissolving therein 2 grains of monobromated camphor. A. J. Ph., July, 1877, p. 370.

EMPLASTRA.

Perforating Plasters.—Prof. J. P. Remington draws attention to an instrument which he has devised for making *porous plasters*, so-called, extemporaneously. He is of the opinion that perforated plasters are much to be preferred to the ordinary hand-made plasters, but when their action is dependent on a decided medicinal ingredient, as in the case of belladonna plaster, the commercial plaster cannot be relied on. The device, by means of which ordinary hand-made plasters may be "*poroused*," is illustrated by Fig. 34. This *tool* consists of a brass, cylindrical wheel, ¾ inch wide, ⅝ inch in diameter, with two circular depressions turned out of each end, ¼ inch deep, leaving a hub on each end of the wheel, through which a steel axle passes into the prongs of a steel handle, which is driven into an ordinary tool handle, 9 inches long. The cylindrical wheel is studded with 16 punches, arranged on either side, ½ inch apart alternately. These punches are of steel, tapered, and ¼ inch long, and ⅛ inch bore at the end, making ⅛ inch perforations. To operate the tool all that is necessary is to dip it first into water; then, having secured the plaster firmly by tacking it to several layers of old newspapers on a rather low counter, grasp the tool tightly with both hands, pushing it along *from* the operator, the wheel revolving as it is pushed forward, the little disks of plaster collect in the punches, stick together and form a core, which falls towards the axle of the wheel, and is driven out by the inclined hub. The tool should be cleaned with a cloth moistened with turpentine, and kept in a box to prevent the punches from being injured. A. J. Ph., April, 1878, p. 171.

FIG. 34.



Plaster Perforator.

Tar Plaster.—F. Marion Murray failing to find a formula for such a preparation recommends the following, after having tried various mixtures. Melt 2 parts of resin and 1 part of pitch together, remove from the fire, add 2 parts of tar and stir rapidly. The resulting plaster mass is adhesive, and forms an elegant plaster when spread.

Prof. Maisch notes that the former Pharmacopœia of Hanover directed this plaster to be prepared from Burgundy pitch 1 part, yellow wax 8 parts, and tar 16 parts. Dorvault's L'Officine credits the following formula to Van Mons: Burgundy pitch 8, yellow wax 80, and tar 125 parts. A. J. Ph., March, 1878, p. 107.

ESCHAROTICA.

Canquoin's Caustic.—In order to counteract the hygroscopic properties of the chloride of zinc paste when made with water, P. Carles proposes to make it as follows: 10 parts of fused chloride of zinc are crushed, rubbed with 2 parts of alcohol of 60 per cent., and then 15 parts of wheat flour are incorporated with it by assiduous trituration. As soon as the paste is homogeneous it is rolled out into a cake, about 1 mm. thick, and after a few hours placed into a flask. New Rem., June, 1878, p. 176; from L'Union Pharm., No. 4, 1878.

EXTRACTA.

Extracts.—Preparations without heat. Prof. Alphonse Herrera proposes a novel process for preparing extracts without heat, which is based upon the idea that when aqueous solutions of vegetable matter are subjected to partial freezing, the unfrozen portion of the liquid retains the vegetable matter, and, on expression from the ice formed, forms a more concentrated solution of the same. This alternate process of partial freezing and expression is repeated several times, and the concentrated liquid is finally evaporated to the desired consistence in shallow dishes, by exposure to the heat of the sun or of a drying-room, the temperature of which does not exceed 30° C (=86° F). The apparatus employed by the author is the so-called *sorbetière* (similar to the apparatus used here for making ice-cream). For the extracts prepared from juice by the method indicated, the author proposes the designation of *opopycnols* (opopicnotées), derived from the two Greek words *οπος*, the juice, and *πυϰνοω*, to condense.

In obtaining artificial extractive solutions the process of infusion should be resorted to, unless the active principles are sparingly soluble in water, in which event digestion or even decoction may be resorted to, but in either event the solutions are treated alike for preparing the extract. The extracts prepared by this method represent the properties of the plant accurately, and the principles which are changed by the influence of heat remain unaltered. Even the volatile constituents are not dissipated, though most of the water may be removed by freezing. Extract of conium, prepared with unpurified juice by this process, has preserved the characteristic odor of conia, and by dissolving it in water furnishes a solution exactly representing the original juice. Extract of rhatany dissolves completely in water, and is much more astringent to the taste than that made by evaporation in the water-bath with the utmost precaution. Similarly favorable results are mentioned by the author as having been obtained with other extracts, with milk, etc. A. J. Ph., Sept. 1877, p. 437.

Extractum Glycyrrhizæ Depuratum.—Gustave A. Appenzeller recommends to dispense in liquid preparations, and more particularly in the officinal mist. glycyrrh. comp., the purified extract of liquorice of the Germ. Pharm. in place of powdered liquorice. Prepared from the commercial extract by that standard it yields a clear solution with water, and an excellent *syrup of liquorice* may be prepared from it by mixing one ounce with a pint of simple syrup.—A. J. Ph., July, 1877, p. 347.

Extract of Malt. (Formulæ of the Paris Pharmaceutical Society.) Take of malt, the germ of which has attained two-thirds the length of the grain, dry at 50° C (= 122° F), grind and treat with two parts of water at the ordinary temperature, stirring the mixture occasionally. After five or six hours express, strain, filter, and evaporate in a shallow dish at a temperature not exceeding 45° C (= 113° F). A. J. Ph., July, 1877, p. 351.

Bonjean's Ergotin.—P. Carles proposes the following method whereby a good product, identical with Bonjean's ergotin, is secured: 1 kilogram of recently collected (best in July) ergot is dried in a moderately warm place during twenty-four hours, reduced to a moderately fine powder, moistened with ⅓ its weight of water, macerated 12 hours, and exhausted by displacement with water. The percolate is evaporated on a water-bath to ⅓ the original weight of the ergot, and mixed with two liters of

90 per cent. alcohol, stirred well, and allowed to settle. A fresh addition of alcohol must not produce any further cloudiness, otherwise more is to be added until this point is reached. After 24 hours, the clear liquid is removed, the residue washed with a little alcohol, the united liquids distilled, and the residue evaporated to the proper consistence; the yield being 80 or 90 grams, which must be immediately placed into vessels, to be tightly closed. New Rem., June, 1878, p. 176; from Rép. de Ph., No. 4, 1878.

Solution of Ergotin, for hypodermic use, is recommended by Montard Martin to be prepared by dissolving 2 grams of Bonjean's ergotin, in 15 grams each of glycerin and water. New Rem., Dec. 1877, p. 370.

Extractum Ferri Pomatum.—Prof. X. Landerer states, that owing to the scarcity, if not absence, of sour apples in Greece, it is proposed to substitute grape-juice instead, and thus make an *extractum ferri uvicum.* A. J. Ph., April, 1878, p. 177.

EXTRACTA FLUIDA.

Fluid Extracts by Repercolation.—In response to the solicitation of the Pharmacopœia Committee of this Association, Dr. E. R. Squibb has communicated an exceedingly valuable paper, in which the plan favored by him for the preparation of fluid extracts is minutely described, and his views, relative to the proper direction in which experiments should be made, before the committee can decide upon formulas for the individual fluid extracts, are expressed. The author observes: "It will not do for the committee to disregard any plan because it is laborious, or troublesome, or expensive, or complicated, or because it is not adapted to the knowledge or capacity of the large majority of physicians and pharmacists. These, though important, are still secondary considerations. The thing to be accomplished in the Pharmacopœia is to have practically perfect preparations in every respect. That is, preparations that are really what they profess to be. They should contain all the active and useful parts of the drug; and shall bear the established relation to the drug, of minim for grain; or weight for weight, if this can be accomplished without materially disturbing the established relation. To effect this object a general scheme, plan, or process, can be adopted, and then every drug must be studied carefully and laboriously."

Dr. Squibb is of the opinion that the original process of Prof. Procter accomplished the exhaustion of the drug insufficiently; and that while this can be remedied by carrying the percolation farther, the evaporation necessary to concentrate a portion of the percolates, very materially changes the dissolved matter, and owing to a failure of the latter to redissolve completely if once precipitated, fails to furnish an accurate representative of the original drug. If, by any process, the complete extraction of the drug can be secured, in such manner that the soluble principles are retained in their natural, unbroken associations, and the resulting preparations be made to conform to the strength designed by the present processes, we are in possession of that process which is best suited to the utility and character of the Pharmacopœia. The author believes that the process of "repercolation," as applied by him and described in numerous papers communicated to this Association since 1865, is the one best adapted and most suitable to secure this end, and in the present paper very minutely describes a "model process," with the main object of showing how, in his judgment, every individual fluid extract must be studied before it is adopted by the Pharmacopœia.

The "model process," as applied to cinchona bark, is briefly described by Dr. Squibb, as follows:

Fluid Extract of Cinchona.—Take yellow cinchona bark, in powder No. 50, 32 parts; menstruum, composed of stronger alcohol, sp. g. 0.819 at 60° F., 2 parts; glycerin, sp. g. 1.250 at 60° F., 1 part, and water 2 parts, a sufficient quantity.

Weigh the stronger alcohol, glycerin, and water in succession, in any convenient quantity at a time, into a tared bottle, and mix them thoroughly. Moisten 8 parts of the cinchona with 8 parts of the menstruum, by thoroughly mixing them, and allow the mixture to stand eight hours in a closely-covered vessel. Then pass the moist powder through a No. 8 sieve, and pack firmly into a percolator. Pour menstruum on top until the mass is filled with liquid and a stratum remains on top unabsorbed; cover the percolator closely and macerate for forty-eight hours. Then arrange the percolator for an automatic supply of menstruum, and start the percolation at such a rate as to give 1 part of percolate in about four hours. Reserve the first six parts of percolate and continue the percolation until the cinchona is exhausted, separating the percolate received after the reserved portion in fractions of 8 parts each.

Moisten a second portion of 8 parts of the cinchona with 8 parts of the weak percolate; the first portion that was obtained next after the reserved percolate, and allow the moist powder to stand for eight hours in a vessel closely covered. Then pack it moderately in a percolator, and supply the percolator automatically with the remaining fractions of the weak percolate in the order in which they were received, and finally with fresh menstruum until the cinchona is exhausted. Percolate in the same manner and at the same rate as with the first portion of cinchona, and reserving 8 parts of the first percolate, separate the weaker percolate into fractions of about 8 parts each.

Percolate the third and fourth portions of 8 parts each of the cinchona in the same way as the second portion.

Finally mix the four reserved percolates together to make 30 parts of finished fluid extract; and having corked, labelled, and numbered the bottles containing the fractions of weak percolate, set them away until the process of cinchona is to be resumed.

When the fluid extract is to be made again, repeat the process as with the second portion, and reserve 8 parts of the first percolate as finished fluid extract from each 8 parts of cinchona from that time forward so long as the fractions of weak percolates are carried forward with which to commence each operation.

A short description of the apparatus recommended by Dr. Squibb as particularly adapted to the process may properly find a place here.

The apparatus adapted to the pharmacopœial quantities of fluid extract, is represented by the cut, Fig. 35 (1, 2, 3), which represents three separate groups of apparatus in position to illustrate three stages of repercolation. The support is a common apparatus stand, the rings of which are reduced to the proper size by short sections of rubber tubing cut open and placed on the wire of the ring when needed; or, a section of larger tubing stretched over the percolator, as in (3). The percolators are common lamp chimneys, costing about five cents each, and are of the size and form known technically as "A" and "B" "sun chimneys." These are of very good form, though not the best, for percolators, and should be selected with as small an opening for the stopper as possible, and with the smoothest, thickest and most regular edge, since it is practically impossible to stop some of their irregular edges tightly. The smaller size (3) holds conveniently 4 ounces of most powders, and the larger holds 8 ounces, to the points shown in the cut. A good soft cork, bored in the centre for a short piece of glass tube of not more than ⅛th of an inch bore, serves to close the small end of the chimney. The short piece of glass tubing should not go quite through the cork on the inside, and should project about an inch outside. A piece of rubber tubing, of not over ⅛th of an inch

FIG. 35.

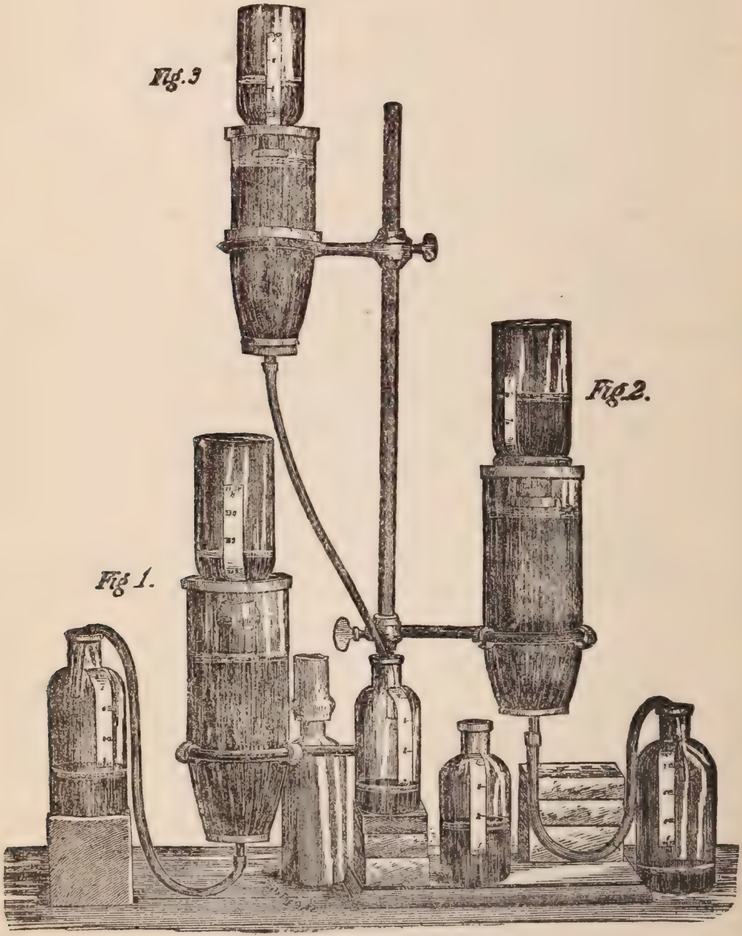


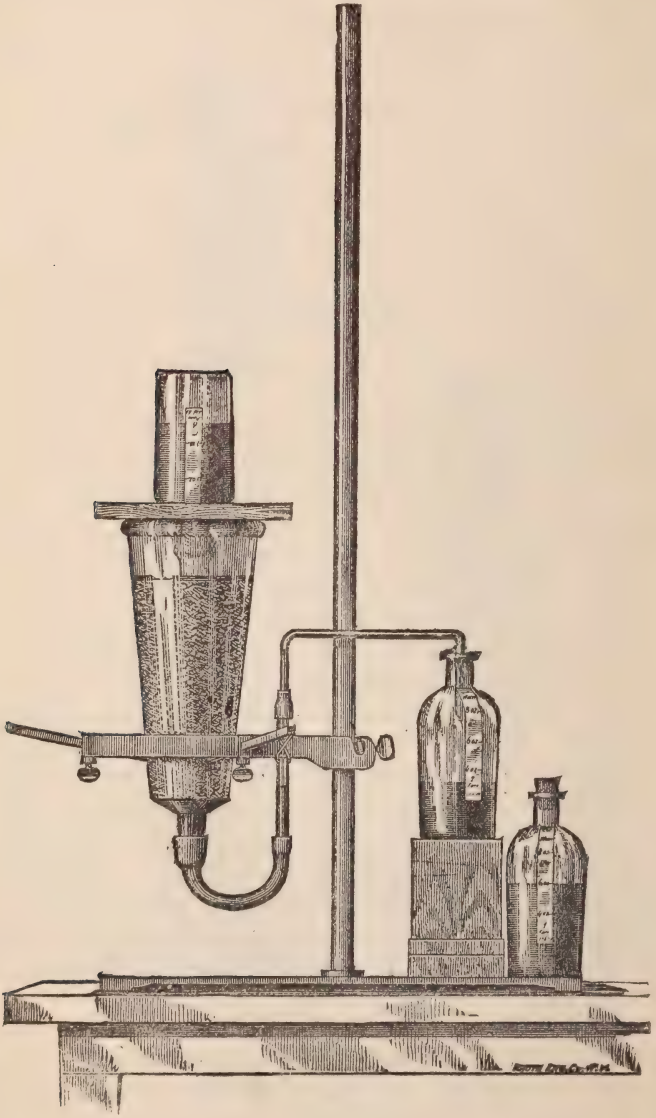
Fig.3
Fig.2.
Fig 1.

Apparatus for Percolation.

bore, and about 13 inches long, has one end slipped on to the glass tube. If this tubing be much longer than the dimensions given it fails to be filled with the liquid, and then when the percolator is in the position of (3), it fails to perform the office of a Sprengel pump in exhausting the liquid and air-bubbles from the lower part of the percolator. Two disks of blanket, or thick flannel, and one of filtering paper, cut a little larger than the inner surface of the cork, and laid upon it, complete the arrangement of the percolator. The powder, moistened with great care and uniformity, is packed loosely, firmly, or very firmly, according to its nature or condition, with the square end of a stick. As a rule the largest practicable proportion of liquid should be used in moistening the powder, because then the powder occupies the smallest space in the percolator, requires the loosest packing, and is saturated for the maceration by the smallest additional quantity of liquid, and therefore gives the most concentrated first percolate for the reserve, and secures the most rapid exhaustion by the smallest quantity of liquid. A disk of filtering-paper is placed on the surface of the powder, of such size that the edge is reflected up against the glass. A disk of board, card-board, or better, of thick sheet rubber, with a central hole 1.5 inches in diameter, is used for a cover. A stratum of liquid, maintained at a uniform thickness of .25 inch should cover the powder from first to last, so that it may not drain and contract or admit air; and this is best maintained by an inverted bottle of the supply liquid, as shown in the cut. The length of the neck and mouth of such bottle may be conveniently elongated when needed, so as to regulate the depth of the stratum of liquid above the powder, by stretching over it a short section of rubber tubing, in the manner shown in the first group of the cut (1). When the percolator is charged and ready for the maceration the small rubber tube is turned up and fastened with a piece of thread or rubber band, so that the end is considerably above the liquid in the percolator, and in so adjusting care must be taken not to close the tube, because as the liquid descends through the powder to fill up all the interstices it is important that the interstitial air should have a free exit by the tube.

The bottles for receiving the percolate are common round-shouldered perscription bottles, 4 ounce for the small percolates, 8 ounces for the larger. A strip of paper should be pasted lengthwise of the bottle, and at the lower end of this the tare should be marked. It should then be graduated to the quantities desired, by weighing into it the proper quantity of water and marking at each level if more than one is desired.

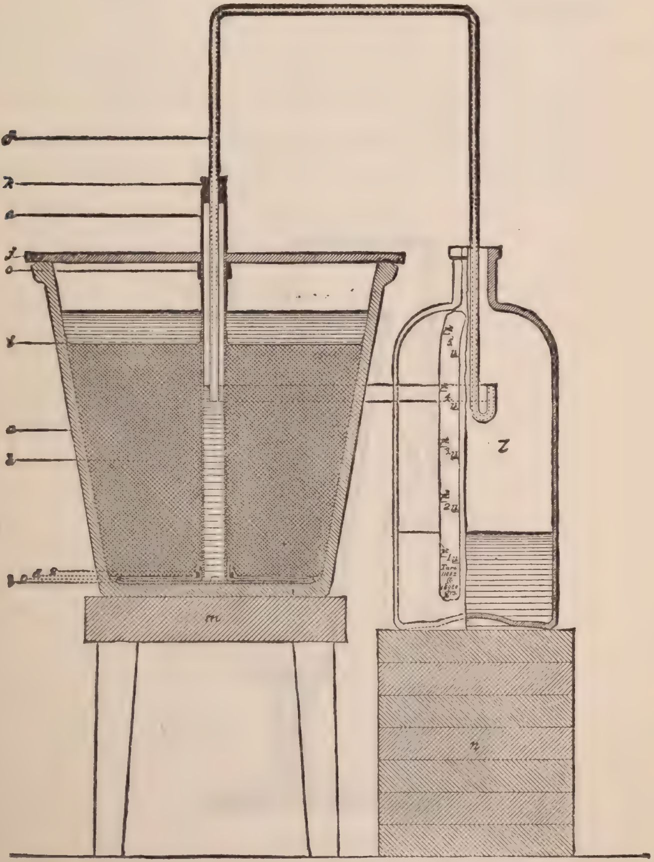
Fig. 36.



Percolation.

The maceration should never be less than 48 hours. When the percolation is to be started the percolator is raised to the position of (3), and the end of the exit tube placed in the bottle marked for the reserved percolate for 10 to 15 minutes, in order that the bubbles of air may be driven out and the tube filled with solid liquid. As soon as this condition is attained the percolator is lowered to the position of (1), and the receiving bottle is then to be adjusted higher or lower until a rate of dropping is established of not more than one drop per minute on this small scale, and one drop every two minutes makes a better rate for such quan-

FIG. 37.

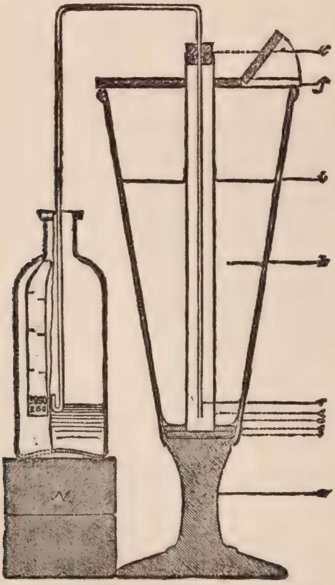


Percolation.

tities. Indeed the rule for all percolations is, the slower the rate the more perfect the exhaustion, and with a smaller quantity of menstruum. With some powders and some degrees of moistening and packing the proper rate of dropping will require the position of (2), and in some cases the position of (3) may be required; but the best percolations are those obtained by the position of (1).

The cut (Fig. 36) shows an adaptation of the common glass percolator to the principle involved in the "siphon percolator," above described, and is adapted for larger quantities. It fulfils the purposes somewhat better than the lamp chimneys, and perhaps nearly as well in most cases as the one represented by Fig. 37, which has already been described in the Proceedings of this association (1872, p. 182), and is now presented, with some slight improvement. Finally, Fig. 38, is another percolator, in which the same principles are applied by the same details as in the percolator, Fig. 37, but having about 5 or 6 times the capacity.

FIG. 38.



Percolation.

Co-operative Experiments on Fluid Extracts are invited by C. Lewis Diehl, in a paper communicated to "New Rem.," May, 1878, pp. 132–136. The plan recommended may be concisely stated as follows: The air dry drug, in powder No. 40 to No. 60, is to be extracted by "simple" or "fractional" percolation. By "simple" percolation is understood the percolation of the whole quantity of drug for the fluid extract at one operation; by "fractional" percolation the drug is divided into two equal portions, the second portion being extracted by fractions of percolate from the first portion, passing after a certain quantity of percolate has been reserved. Certain quantities of percolate are obtained in consecutive portions, and the amount of extracted matter in them is appropriately determined. The total reserved portions—that to which no heat is applied—is in each case, for 16 troy ounces of the drug, twelve fluid ounces; the remaining portions of percolate are evaporated to such measure, that with the alcohol that it may be necessary to add to bring the evaporated portion to the original strength of the menstruum employed, the liquid shall measure exactly four fluid ounces; the author being of opinion, that the restoration of the menstruum in the evaporated portion to its original strength will correct one of the faults of the present formulas in which hydro-alcoholic menstruum are directed. The sp. gr. of the finished fluid extract, and the quantity of extracted matter in it are to be determined, and the result of the latter determination is to be compared with that obtained by determining the extracted matter in a tincture, prepared from the same drug by maceration for 14 days. Portions of the fluid extract, of the tincture, and of the original powdered drug, are to be reserved for future examination. The addition of glycerin is to be avoided wherever practicable. The data obtained are intended to show the degrees in which the drug is extracted by the consecutive portions of menstruum, and to point out, if possible, the proper formula for fluid extracts to the Committee on Pharmacopœia Revision of the Amer. Pharm. Association.

Fluid Extracts—Use of Glycerin.—J. W. Lehman has made a number of experiments with officinal and unofficinal fluid extracts, with a view of determining the preservative qualities of glycerin in this class of preparations. From his results the author concludes that the use of glycerin in fluid extracts of astringent drugs adds much to the beauty and stability of the preparation. Its use appears to be indicated for those drugs, the active principles of which are soluble in water and dilute alcohol. In fluid extracts of mucilaginous drugs like pleurisy-root, it cannot be used to any great extent, and it is best discarded altogether in all cases where the active principle is of a resinous nature. A. J. Ph., July, 1877, p. 346.

Fluid Extract of Cimicifuga.—J. U. Lloyd has made a series of experiments on fluid extract of cimicifuga, which not only decide certain important points in relation to this particular fluid extract, but also furnished valuable information for general application. The author, with a view of controlling his subsequent experiments, subjected 438 grs. of powdered cimicifuga—being part of a 1000 lb. lot, one-half of which had been finely powdered, the other coarse—to percolation with stronger alcohol, using a half-inch glass tube, drawn to a syringe-point at its lower orifice, as a percolator. The first 112 fluid ounces of percolate contained 59.51 grains of dry extract; the next 64 fluid ounces contained 5.12 grains more, making a total of 64.63 grains of dry extract from 438 grains of the powdered root, or 70.83 grains from a troy ounce. This, while perhaps not an absolutely complete extraction of the resin, was considered so for the present experiments. Impressed with the idea that the height of the column, which a given quantity of the powdered drug occupied in the percolator, would necessarily have an influence on the degree to which a given volume of menstruum was capable of extracting it, the author had constructed for him a series of ten tube percolators, of such diameter, that 16 troy ounces of the powder would occupy, when properly packed, heights varying from 15 inches down to 1.5 inches. The length of these tubes was uniformly thirty-six inches; their diameter respectively 2.45, 3.46, 4.24, 4.90, 5.84, 6.0, 6.48, 6.93, 7.35 and 7.75 inches, and the heights that the column of 16 troy ounces of the packed powder occupied was, in the same order, 15.0, 7.5, 5.0, 3.75, 3.0, 2.5, 2.14, 1.88, 1.67 and 1.5 inches. With this series of percolators experiments were made with the following three processes:

1*st Process, that of the U. S. Ph.*—This was followed accurately, using 16 troy ounces of the powder for each percolator, moistening and packing according to the directions given (pressing each quantity to the exact height corresponding to the percolator into which it was introduced), allowing to macerate four days, and obtaining 14 and 10 fluid ozs. of percolate.

2*d Process, Percolation without maceration.*—This was the same as the first, with this difference, that percolation was allowed to go on at once, without maceration. 14 and 10 fluid ounces of percolate was obtained from each lot and the fluid extract finished according to the directions of the Pharmacopœia.

3d Process, U. S. Dispensatory, page 1164 (*note*).—In the experiments with this process the portions of 16 troy ounces of powdered cimicifuga were intimately mixed, each separately, with 32 fluid ounces of alcohol, and allowed to macerate 30 minutes, when each portion was transferred to a percolator, comprising the same series as in the first and second process. When the liquid disappeared below the surface of the powder, alcohol was added until a sufficient amount of percolate had been obtained, said percolates being reserved in portions of 14 and 10 fluid ounces, and the fluid extracts finished according to the Pharmacopœia directions.

The details of these processes, as carried out by the author, are too voluminous to find a place here. The result of each series of experiments is given by the aid of tables (Nos. 1, 2, and 3), and from these it appears that the 2d process, that of percolation without maceration, gave the best results. In process No. 1 and No. 2 the best results were obtained with the percolators necessitating a high column of powder, although the results were in neither case uniform. For example, the total yield of extract from the powder in the 2.45 inch percolator (15 inch column) by the first process is 635.86 grs.; the quantity of extract from the next size (3.46 inch), is a little more (640.58 grs.), and then is decreased regularly until the 6.48 inch percolator is reached, which is 451.06 grs., while the very next (6.93 inch) percolator yielded 507.75 grs. of dry extract. The result with the second process is similar, and also with the third, in which, however, the yield of extract is much less, and the yields do not vary very extremely among each other. The highest yield with this third process, was in the narrowest percolator (2.45 inch), being 516.01 grains; the lowest with the widest (7.75 inch), being 402.07 grains; but the fourth percolator in the series (4.90 inch) yielded very little more, being 420.36 grains.

The next experiments were by "Repercolation," and were not favorable to it. The results are given in three tables (Nos. 4, 5, and 6). An experiment of "Simple percolation," corresponding to that noted in table No. 6, is noted in table No. 7, and appears to have given more favorable results than the method of repercolation. Finally, the author sums up his results in an 8th table, as follows:

Taken from table.	Sixteen fluid ounces of fluid extract made by	Represents dry extractive matter.	Represents grains of cimicifuga.	Or the total amount of extract in the root, taken as a unit.
No. 2.	Percolation without maceration.	825.97 grs.	5597.52 grs.	.730
No. 6.	Repercolation.	648.85 grs.	4397.20 grs.	.573
No. 1.	U. S. P.	640.58 grs.	4341.15 grs.	.565
No. 3.	U. S. Dispensatory, page 1164 (note).	516.01 grs.	3496.85 grs.	.455

According to these experiments, it appears that in none of the processes the officinal amount of alcohol is capable of extracting an extract to represent the powder operated on. (The most remarkable result, however, and one that is contrary to all accepted theories, is that *percolation without maceration* should give better yields of extract than *percolation with maceration*, for four days, according to the directions of the U. S. Ph. The experiments on this point, as well as on some others, seem to require repetition. Rép.) A. J. Ph., Jan. 1878, pp. 1 to 15.

Extractum Ergotum Liquidum, for hypodermic injections, is prepared by Yvon as follows: Coarsely powdered ergot is treated with bisulphide of carbon, the extracted drug is dried in the light and air to remove all traces of the bisulphide, and is then exhausted by percolation with water containing 4 per mille of tartaric acid. The solution is boiled to precipitate albuminous matter, reduced by evaporation to one-third its volume, cooled, filtered with a slight excess of carbonate of calcium to remove excess of tartaric acid, filtered, precipitated with 90 per cent. alcohol, and filtered. The filtrate is now decolorized with washed animal charcoal, filtered, and the alcohol driven off. Distilled water is now added to make the weight equal to that of the ergot originally used, and for every hundred of the latter, 0.15 of salicylic acid is dissolved in the liquid, which is left to deposit a few days and is then bottled in small vials. It is said that this preparation thoroughly represents its own weight of the drug. Chem. and Drug., Nov. 1877, p. 438; from J. de Ph. et de Chim.

Fluid Extract of Thuja Occidentalis.—W. H. Lawes communicates the following formula: Thuja occidentalis, ℥xvj; percolate with alcohol ℥x, and set aside. Continue the percolation until the thuja is exhausted, evaporate this percolate to ℥vj, and add the first portion (see Thuja occidentalis). New Rem., Oct. 1877, p. 317.

Fluid Extract of Jaborandi.—F. V. Greene proposes a formula for the preparation of fluid extract of jaborandi. In the manipulation directed he advises the use of a layer of sand on the surface of the powder in the percolator for the following reasons: On examining a leaflet of jaborandi, it is found that it is coriaceous in texture, and that, in addition to a prominent midrib, it contains a large number of veins which, leaving the midrib at an angle of about 60°, run in a parallel line to within a quarter of an inch of the margin, where they anastomose. The cellular tissue, which is covered with a tough epidermis, is studded with numerous receptacles of secretion, which give the leaves their pellucidly punctate appearance when held up to the light. As the result of this peculiar construction, when the leaves are ground in a mill, the woody structure is readily reduced to powder or very fine fibres, while the cellular portion is merely broken up into small fragments, still covered by the epidermis. If the material be moistened in this state with the menstruum and placed in a perculator in small quantities at a time, it will be found in packing it, that it will spring up against the fingers as soon as the pressure is removed, and if, notwithstanding this fact, the percolation is proceeded with, on addition of more menstruum the material will separate into several portions or layers, and the operation be thus rendered a failure. By reducing the leaves to a moderately fine powder, moistening the powder thoroughly, packing it into a conical glass percolator, covering the surface with a cloth, and then with a layer of two inches of well-washed sand, this is completely overcome, and the percolation will proceed regularly and successfully. The author proposes alcohol of 50 per cent. as menstruum: for 16 troy ounces of the leaves employed the first 14 fluid ounces are reserved, the percolation continued to exhaustion, and the second percolate evaporated to 2 fluid ounces and mixed with the reserved portion. A. J. Ph., Aug. 1877, p. 392.

GLYCERITA.

Glycerinum Cinchonæ.—F. Anderson has made a number of experiments which convince him that glycerin may be profitably employed for the extraction and retention in solution of the active constituents of cinchona bark. He proposes the following formula for a "Glycerinum cinchonæ:"

Four ounces of coarsely-powdered yellow bark are mixed with eight fluid ounces of glycerin, heated for a short time over a water-bath, and allowed to stand till cold; water is now added in successive portions, and strained or poured out until there appears no extractive left; the whole is then evaporated to the original volume of the glycerin (8 fluid ounces). When carefully made, this liquid represents half an ounce of Peruvian bark in each fluid ounce. Yearbook of Ph., 1876, p. 558.

Glycerite of Thuja Occidentalis.—W. H. Lawes gives the following formula: Thuja occidentalis, ℥viij; percolate with a mixture of equal parts of glycerin and alcohol to f℥iij, and evaporate the percolate to f℥iv. (See Thuja occidentalis.) New Rem., Oct. 1877, p. 317.

Glycerite of Phosphorus.—Charles Ménière recommends to mix some sugar or gum arabic with sufficient glycerin to obtain a mixture of the consistence of honey; this is heated to 43° C. (= 110° F.), when 0.10 gram of phosphorus is dropped in and finely divided with the aid of a pestle. Enough glycerin to make 1000 grams is then added in small quantities, the heat of the water-bath being kept at about 50° C. (= 122° F.); the turbid mixture gradually becomes clear, is then set aside for twenty-four hours, filtered and bottled. A. J. Ph., Sept. 1st, 1877, p. 444. From Rép. de Pharm.

New Medicinal Solution of Phosphorus.—W. W. Urwick finds that the following solution of phosphorus has kept well for two years without the phosphorus passing in the amorphous state, or the solution becoming acrid or losing its luminous properties when mixed with water and agitated: 2 grains of phosphorus are divided in 1½ ounces absolute alcohol; to this a solution of ½ ounce cane sugar, ¼ ounce sugar of milk, and the albumen of one egg, in glycerin, is added, the whole well mixed, and the mixture made up to 10 ounces by the further addition of glycerin. Wishing to make the solution more agreeable to the palate, the author added a little oil of neroli, but found that the odor, taste, as well as its phosphorescence when mixed with water, were thereby completely destroyed. Like results were obtained on adding tincture of orange, or tincture of gentian, essence of lemon, and oil of cloves. With the tinctures of calumba, quassia, or nux vomica, the phosphorescence, smell and flavor, remain unaltered. Orange-flower water had little more effect than common water. Yearbook of Ph., 1877, p. 607.

INFUSA.

Tar Water.—(Formula of the Paris Pharmaceutical Society.) The wood tar should be of a red-brown color, transparent and free from resinous deposits. Mix 5 grams of such tar with 10 grams of pine-wood sawdust, and macerate for twenty-four hours with 1000 grams of distilled rain-water, stirring frequently. A J. Phar., July, 1877, p. 350.

LINIMENTA.

Volatile Liniment.—In one of the earlier volumes of the "Pharmacist," R. Rother recommends the addition of a little oleic acid to the liniment of the Pharmacopœia. Hans M. Wilder considers this a good idea, and finds that it prevents the separation of the liniment, keeps it from solidifying, and makes it quite white. It is immaterial what kind of oil is taken, and 6 to 10 drops of oleic acid added are sufficient. A. J. Ph., Sept. 1877, p. 441.

Spiritus Saponis.—G. H. Barkhausen communicates his experience in the manufacture of medicinal soaps (see *Soaps*) and its preparations. He finds that olive oil will saponify perfectly if to 100 parts a filtered solution of 16.5 parts of caustic potassa in 300 parts of alcohol are added, and the mixture is digested at 100° C. (= 212° F.) for about an hour; 250 parts of rose-water are then added

Liquid Opodeldoc is made by adding to the alcoholic solution of soap, obtained as above, 600 p. of alcohol, 400 p. of water, 25 p. camphor, 5 p. oil of thyme, 10 p. oil of rosemary, and 40 p. aqua ammonia. Schweiz. Wochenschr. f. Ph., April 26th, 1878, p. 147.

Glycerin Lotion.—J. B. Moore communicates the following formula for a "glycerin lotion," which he recommends as a most elegant and useful preparation. Upon ½ drachm of quince-seed in a bottle, pour 8 fluid ounces of hot water, agitate well occasionally until a mucilage is formed, and strain. Then shake together in a second bottle 13 fluid ounces of hot water, and 16 drops oil of rose, add the mucilage of quince-seed and 6 fluid ounces of glycerin, and again shake well; finally add 5 fluid ounces of deodorized alcohol in which ½ grain aniline red has been previously dissolved. Drug. Circ., April, 1878, p. 70.

LIQUORES.

Dialysed Iron.—History. Prof. J. M. Maisch contributes some historical notes on dialysed iron, from which it appears that the first paper on this subject deserving notice is one by John M. Ordway, entitled "Examination of soluble basic sesquisalts," which was published in the Am. Journal of Science and Arts, 1858, p. 197. This author says: "Time is a very important element in the production of the highly basic compounds. One may easily be deceived as to when the hydrate ceases to be dissolved, and may set down as opaque that which by longer digestion becomes quite transparent. By successive steps we get pretty easily as far as Fe_2Cl_6, $11Fe_2O_3$, and in the course of several weeks I have gone as high as Fe_2Cl_6, $23Fe_2O_3$." In 1859 Béchamp published a paper in which Ordway's statements are in the main corroborated, but he gives the most basic compound obtained Fe_2Cl_6, $20Fe_2O_3$. In both cases the solutions of the normal salt were digested with ferric hydrate. Thomas Graham, in 1861, announced the following results: "If recently precipitated ferric hydrate or carbonate of ammonium is added to an aqueous solution of ferric chloride, as long as the precipitates are redissolved, and if the dark-red solution thus obtained, containing 4 to 5 per cent. of solid matter, subjected to dialysis, mainly muriatic acid will pass through the septum, upon which, after 19 days, remains a liquid containing from 98.5 parts of oxide, 1.5 part of muriatic acid. It remains liquid for 20 days and then gelatinizes, separating ferric hydrate. A similar solution of colloidal ferric hydrate may be obtained by dialysis of ferric acetate, and contains 6 parts of acetic acid to 94 parts of ferric oxide."

Prof. Maisch's paper is particularly intended to correct the erroneous conception—fostered by some manufacturers—that dialysed iron is a solution of oxide of iron free from chloride. There is *no soluble oxide of iron,* but what is sold as such, be it imported or made in this country, is *very basic oxychloride of iron.* The author expresses the opinion that, while a highly basic oxychloride can doubtless be obtained by direct solution of ferric hydrate in ferric chloride, dialysis appears to be unavoidable to secure a preparation free from a distinct ferruginous taste. The characteristics of a 5 per cent. solution of dialysed iron may be stated to be—

1. The deep brown-red color, which in thin layers is perfectly transparent.

2. The freedom from odor and taste, it being merely faintly astringent to the palate.

3. The absence of even slight acid reaction to test-paper; and

4. The behavior to tannin and to saline solutions (even spring-water), as stated in the following:

Tannin in small quantities darkens the solutions somewhat; using a stronger solution of tannin a well-diffused gelatinous precipitate takes place, having a deep brown, but not a black color, and the filtrate is colorless. Saline solutions produce precipitates, which disappear again on diluting with distilled water. A. J. Ph., July, 1877, p. 343.

Ferrum Catalyticum.—This preparation, introduced by Dr. Wagner of Buda-Pest (see Proceedings, 1877, p. 87), and which is claimed by him to be free from chlorine and to contain 6.018 per cent. of ferric oxide, has been analyzed by Fr. Oltmann, who finds it not only to contain chlorine, but that it also contains much less ferric oxide than is claimed by the inventor. Dr. Hager had (in Ph. Centr. H., 1876, No. 46) declared this preparation to correspond to his "Liquor Ferri per oxychlorate," which is simply a solution of ferric oxyhydrate in ferric chloride, and this view seems to be substantiated by Oltmann's results, who obtained 2.4 per cent. of Fe_2O_3, the quantity indicated by its sp. gr. (1.022). The amount of chlorine present proved to be 0.29 per cent. Ph. Centr. H., Nov. 29th, 1877, p. 401.

Dialysed Oxide of Iron.—(Formula of the Paris Pharmaceutical Society.) 100 grams of solution of ferric chloride, of 30° B., are mixed in small quantities with 35 grams of ammonia water of 22° B. The precipitate dissolves at first rapidly, afterwards very slowly. When the liquid has become transparent it is introduced into a dialysator, and this is placed in distilled water, which is frequently renewed, until the liquid is no longer precipitated by nitrate of silver and is destitute of acid reaction. It still contains a small quantity of hydrochloric acid, which may be recognized by precipitating with ammonia, acidulating with nitric acid, and testing with nitrate of silver. 10 cc. of the liquid, which is entirely free from disagreeable ferruginous taste, are evaporated, and from the weighed residue the amount of water is calculated which must be added to obtain a solution containing in 100 cc. 1 gram of solid matter. A. J. Ph., July, 1877, p. 349.

Dialysed Iron—Preparation.—Andrew and H. C. Blair communicate their experience with dialysed iron. They find that the process of dialyzation can be very much shortened if a given quantity of liq. ferri. per chlor. is precipitated with ammonia, the precipitate well washed, dissolved in a sufficient quantity of the same solution of perchloride of iron, and then subjecting to dialysis; the water used in the process of dialysis being changed every 24 hours. In this manner the process may be completed in one week. Another method, which consists in adding to the liquor ferri chlor. sufficient aq. ammonia to almost produce a precipitate, and then subjecting the solution to dialysis, has also given good results in the experience of the authors. A. J. Ph., July, 1877, p. 340.

Dialysed Iron.—Some practical remarks on the sp. gr. of dialysed iron in reference to its strength, and the method of its preparation, are also made by E. B. Shuttleworth. Attention is prominently drawn to the fact, that in determining the strength of solutions of dialysed iron, it is important that the residual ferric compound be heated to calcination, and weighed while warm. If the solution is simply evaporated on a water-bath it may indicate 5 per cent. or more, even when its sp. gr. is considerably below that now generally accepted as indicating a 5 per cent. solution (sp. gr. 1.046); and if, after completely drying, the capsule be exposed for some time, owing to the absorption of water, there will be an appreciable increase in the weight. Can. Ph., Jour., Oct. 1878, p. 73, and Dec. 1877, p. 141.

Dialysed Iron, Peroxychloride of Iron, Catalytic Iron, and Liquor Ferri.—Prof. E. Scheffer reports some interesting experiments which throw some further light on the relation of dialysed iron, peroxychloride of iron, and catalytic iron. He finds, that if ammonia water is added to solution of perchloride of iron until a further addition will form a permanent precipitate, the addition of just 2 per cent. more of the quantity of ammonia water already added will precipitate all the iron, but the supernatant liquid will have acid reaction. The ferric hydrate, if washed with distilled water by decantation, after several washings settles slowly; at this point it is transferred on a filter, and if the washing is continued, the precipitate finally assumes a very dark brown, almost black color, and a gelatinous condition, while the wash water no longer passes through the filter. If the gelatinous mass is then removed from the filter, and a little water added, it will dissolve completely after a short time.

By using more ammonia than is necessary to precipitate the iron completely, precipitates are obtained, which are also soluble in water, provided that ammonia was not added in excess, *i. e.*, to alkaline reaction of the supernatant liquor. In the latter event, the precipitate is free from chlorine, but contains *ammonia*, and will no longer dissolve; while if the supernatant liquid is acid, or just neutral, the precipitates contain only *chlorine* in combination, and will dissolve with more or less facility; the rapidity of solution being diminished in the proportion that the condition of the mixture approaches neutrality. It is found at the same time that the nearer neutrality is approached, the more perfectly can the precipitate be washed out, and thus deprived of muriate of ammonia, the presence of which in undue proportions causes the gelatinization of solution of basic oxychloride of iron, catalytic iron, or dialysed iron. The following table, compiled from the author's results, shows the character of the ferric solutions obtainable by increasing the quantity of ammonia *beyond* that necessary to complete precipitation and *within* neutral reaction:

Dilute solution of ferric chloride employed.	Dilute solution of ammonia required to precipitating point.	Dilute solution of ammonia required in addition to effect complete precipitation.	Dilute solution of ammonia used in excess of that required to effect complete precipitation.	Composition of the basic oxychloride obtained in solution.	
				Fe_2O_3	Fe_2Cl_3
150 cc.	81.3 cc.	1.7 cc.	None.	82.6 per cent.	17.4 per cent.
"	"	"	5.1 cc.	90. "	10. "
"	"	"	6.8 cc.	91. "	9. "
"	"	"	7.65 cc.	92. "	8. "
"	"	"			

A solution obtained by adding 1 per cent. of ferric chloride solution to the precipitate caused by 89 cc., washing, a.c., contained an oxychloride composed of 90 2 per cent. of Fe_2O_3 and 9.8 per cent. Fe_2Cl_3. A precipitate obtained with 91.5 cc. of dilute solution of ammonia, and washed until the washings no longer gave the faintest reaction with nitrate of silver, had at the date of the author's paper—after standing a little over seven weeks—dissolved to the amount of about three-fourths of the original precipitate. Should this eventually dissolve completely, the solution will contain a basic oxychloride having the composition of 97.83 per cent. Fe_2O_3 and 2.17 per cent. Fe_2Cl_3.

A number of commercial samples of "dialysed iron" were examined by the author, and proved to contain ferric oxide and ferric chloride in the following proportion:

I. =	Fe_2O_3,	91	per cent.,	and	Fe_2Cl_3,	9	per cent.
II. =	"	92.6	"	"	"	7.4	"
III. =	"	9.447	"	"	"	5.53	"
IV. =	"	93.3	"	"	"	6.7	"

The author refers to the "Liquor ferri peroxychlorati" of Dr. Hager, obtained by dissolving ferric hydrate by the aid of a small quantity of solution of ferric chloride. This preparation contains, when all the ferric hydrate is dissolved, a basic oxychloride composed of 85 per cent. Fe_2O_3 and 15 per cent. Fe_2Cl_3. It is liable to contain much muriate of ammonium.

Dr. Wagner's "Catalytic iron," the formula for which is not published, he believes to be prepared after the manner explained in his above experiments. These teach, that a preparation of a perfectly pure ferric hydrate is very difficult, almost impossible, as in one case it is apt to contain chlorine, in the other ammonia. They prove that the precipitate of oxychloride of iron is soluble in pure water, and that in its more basic combinations it is soluble only when free from saline compounds. They likewise prove that a solution of a very basic oxychloride can be prepared without dialysis, and that the product may be made to contain a less percentage of chlorine than that found in the best commercial samples of dialysed iron examined by the author. A. J. Ph., March, 1878, p. 97.

Dialysed Iron—Analyses.—Henry Trimble has examined six specimens of dialysed iron, which he procured from leading manufacturers of Philadelphia, and estimated the chlorine and iron in them by the following process: A weighed quantity—about 5 grams—of the solution was diluted with water, treated with aqueous ammonia and heated until all the iron was precipitated. This was filtered off, washed thoroughly, ignited, and weighed as Fe_2O_3. The filtrate and washings were heated to expel ammonia, and treated with nitrate of silver and nitric acid. The mixture was heated, agitated until the chloride of silver cohered; this was collected, washed, ignited, and weighed as chloride of silver, from which the percentage of chlorine was calculated. The following table gives the results obtained with the preparations mentioned:

	Per cent. Fe_2O_3	Per cent. Cl.	Per cent. of the salt.	Formula. (O = 16.)
I.	3.143	.140	3.192	29 Fe_2O_3, Fe_2Cl_6
II.	3.443	.154	3.497	29 Fe_2O_3, Fe_2Cl_6
III.	2.394	.156	2.514	19 Fe_2O_3, Fe_2Cl_6
IV.	2.583	.286	2.804	11 Fe_2O_3, Fe_2Cl_6
V.	4.677	.198	4.831	31 Fe_2O_3, Fe_2Cl_6
VI.	2.874	.235	3.058	16 Fe_2O_3, Fe_2Cl_6

A. J. Ph., Feb. 1878, p. 60.

Ferrum Dialysatum.—Henry G. Debrunner proposes a colorimetric method for determining the strength of ferrum dialysatum, which is as follows:

A. The standard solution consists of 10 cc. of dialysed iron (5 per cent.), diluted with distilled water of 60° F. to the volume of 200 cc. Twenty cc. of this solution are then introduced into a true cylindrical tube of 50 to 60 cc. capacity, graduated into 0.1 cc. In order to make the *B. Colorimetric comparison,* 2 cc. of the solution to be tested are put into a similar tube of exactly the same dimensions, and diluted with distilled water until its shade is exactly the same as that of the standard. To produce a perfect mixture, the tube is shaken after every addition of water. A little calculation will then determine the strength of the solution under examination.

The author has prepared dialysed iron by one of the recently published methods. It possessed the characteristic properties of the commercial article and left on evaporation in the water 5.03 per cent. of hydrated ferric oxychloride. On analysis, the preparation was found to have the following composition:

Ferric oxide, Fe_2V_3,	4.02	4.71 per cent.
Ferric chloride, Fe_2Cl_6,	0.69	
Water, H_2O,	95.29	
	100.00	

These figures lead to the approximate formula $Fe_2Cl_6+12Fe_2O_3$ (O–16). A. J. Ph., Nov. 1877, p. 535.

Dialysed Iron—Applicability as an Antidote to Arsenic.—R. V. Mattison communicates the result of some experiments, which seem to show that solution of dialysed iron may be advantageously used as an antidote for arsenical poisoning, if its administration is followed by the free use of chloride of sodium. By following the administration of the dialysed iron by a teaspoonful or more of common salt, ferric hydrate is precipitated, and the neutralization of the poison is thus secured. Indeed, the author cites a recent case of poison by arsenic in which dialysed iron proved an effective antidote without the subsequent administration of chloride of sodium, and, it appears, that its administration was not even followed by an emetic. The dialysed iron was given in continued doses of 2 fluidrachms, largely diluted with water. A. J. Ph., Jan. 1877, p. 23.

Dialysed Iron—Antidote to Arsenic.—W. Gibbons has made some direct experiments with solution of dialysed iron and solution of arsenic, which appear to show that dialysed iron may be used as an antidote to arsenic, provided the administration is preceded by some bicarbonate of sodium or magnesium to neutralize the acidity of the stomach. f℥ij of dialysed iron (containing 38 grains Fe_2O_3) were diluted with ¼ liter of water at 98.40° F., and an acid solution containing 1 grain of arsenious acid. No precipitation was produced in this mixture, but on adding a small quantity of bicarbonate of sodium, a precipitate was produced, and after being kept at 98.4° F. for an hour, was found to contain 40 per cent of the arsenic introduced. The author is convinced that by using an excess of dialysed iron, it will act as an antidote to arsenical poison. It is to be regretted, however, that he failed to make the experiments that can prove this beyond a doubt; at least in as far as experiments, not actually made upon the animal body, can be considered proof. Ph. J. Trans., June 15th, 1878, p. 1001.

A paper on "Dialysed Iron," reviewing particularly the character of ferric oxides as obtained under various conditions, is communicated to New Rem. (Sept. 1877, p. 272). In reference to the reported power of dialysed iron as an antidote for arsenic, the author, evidently one of the editors of "New Remedies," lays particular stress upon the fact, that this property remains to be clearly demonstrated. The claims of some manufacturers, that dialysed iron is a solution of *pure* ferric oxide, are based upon error; in such solutions chlorine can always be determined by appropriate methods.

Solution of Albuminate of Iron.—Dr. Friese recommends a solution of "Albuminate of iron" for the treatment of chlorosis and rachitis. It is prepared by dropping 10.0 grams of liquor ferri sesquichlorati on the white of one egg, washing the precipitated albuminate with distilled water to remove the excess of sesquichloride of iron and free hydrochloric acid, and then adding to the residue 500.0 grams of distilled water and 12 drops of hydrochloric acid. Complete solution—with the exception of a few flakes—is effected in the course of three days. He employs it in conjunction with an ethereal tincture of phosphorus (0.05 phosphorus to 30.0 ether), of which 12 drops are added to 250.0 grams of the solution of ferric albuminate. The dose is a tablespoonful thrice daily, and has proved very successful in the treatment of the diseases mentioned. Ph. Centr. H., Aug. 2d, 1877, p. 251.

Kobigk has prepared albuminate of iron by the method recommended by Friese, and has found that it is necessary to operate with care, and that the product is by no means constant in composition. When the precipitate is treated with a large quantity of water, for the purpose of washing by decantation, it is almost completely dissolved; it is better to transfer the precipitate immediately to a filter, and to wash it as long as the filtrate passes clear; for if the washing is continued after that period, albumen is dissolved and separates. The residual albuminate of iron is readily dissolved by water acidulated with hydrochloric acid. That the product is not constant in composition is evidenced by the result of two determinations, in one of which 100 grams of the albuminate was proved to contain 0.028 grain of metallic iron; in the other 0.056, or just double the previous quantity. Dr. Friese states that the albuminate of iron made by his method contains 2.80 per cent. of metallic iron; the 10 grams of liquor ferri sesquichlo. contain 1.5 grams of iron. The solution of albuminate of iron, as has already been stated by Dr. Friese, will decompose on keeping, and must be prepared as wanted. Schweiz. Wochenschr. f. Ph., Nov. 23d, 1877, p. 281.

C. Bernbeck offers the following suggestion regarding the preparation of albuminate of iron solution, which he regards as a valuable addition to the list of remedial agents: The officinal liq.

ferri sesquichlorati nearly always contains an excess of hydrochloric acid, the presence of which, by its solvent action, causes a loss of albuminate of iron during the washing necessary before its final solution. To prevent this he proposes that the ferric chloride solution be evaporated to dryness; that 6 parts of this be dissolved in 10 parts of dist. water, filtered, and mixed with 20 parts of albumen. The brown-yellow magma is transferred to a strainer, well expressed with the hands, treated with a little dist. water, again expressed, and this repeated until all excess of ferric chloride is removed. The residue is then dissolved in water containing 12 drops of hydrochloric acid to the ½ liter, by macerating for 1 or 2 days, and the solution filtered. J. Arch. Ph., Dec. 1877, p. 521.

Albuminate of Iron.—Dr. Choisnard again calls the attention of physicians to this compound as a remedial agent, which, according to his observation, is more readily absorbed than any other compound of iron. It was first prepared by Lassaigne, under the name of *albuminate of iron and potassium*, and is prepared as follows: A solution of 100 parts of white of eggs is precipitated by 36 parts of a solution of ferric tersulphate, sp. gr. 1.036; to the mixture is added a solution of 2 parts of caustic potassa, dissolved in 50 parts of water, whereby the precipitate is redissolved and an orange-yellow solution obtained, which is made into a syrup by the addition of 1½ times its weight of sugar. The finished anhydrous syrup contains 1 per cent. of anhydrous ferric oxide.

Ferrum Albuminatum Siccum.—E. Merck states that dry albuminate of iron, which only requires solution in water to make Friese's solution of albuminate of iron, may be obtained by the following method, suggested by Dr. Hoffmann: 15 p. of crystallized ferric chloride (containing 20 per cent. of metallic iron), or 20 p. of liquor ferri sesquichlorati, are dried with 10 p. of dextrin at 40° to 50° C. (= 104° to 122° F.), and pulverized; then 80 p. of pulverized albumen are mixed with it. The latter is obtained by mixing fresh albumen with half its weight of water, setting aside for several hours, then removing the membrane by straining, and finally evaporating on flat plates at a temperature of 30° to 40° C. (= 86° to 104° F.), which is easily accomplished, albumen being not in the least hygroscopic, and is easily removed from the plates when dry. The albuminate of iron obtained by the above process, is described by Merck to consist of small brownish-red luminous crystals (? Rep.), not hygroscopic, slowly soluble in 50 parts of cold water, and more readily in the same solvent at 30° to 35° C. (= 86° to 95° F). Its solution is translucent and opalescent, neutral to test-paper, but will precipitate oxide of iron in flakes after standing for some time, which readily redissolves on addition of a few drops of HCl. The author considers this dry albuminate of iron by far preferable for making Friese's solution, claiming, that in this manner, the solution will always have a uniform taste, composition, and strength. A. J. Ph., June, 1878, p. 298; from Phar. Zeit., March, 1878.

Liquor Potassii Arsenitis.—J. C. Wharton recommends the following as an improvement of the formula of the Pharmacopœia, the improvement claimed being easy and rapid execution and simplicity of apparatus: Arsenious acid, in small pieces, 64 grains; fused potassic hydrate, 36 grains; compound spirit of lavender, half a fluid ounce; distilled water, a sufficient quantity. The arsenious acid is to be rubbed to a fine powder, then the potassa and a fluid drachm of water is to be added, the mixture brought to a creamy consistence, transferred to a glass vessel or test-tube, heated until the solution is effected, etc. The author draws attention to a slight deficiency in the quantity of bicarbonate of potassium directed in the officinal formula.* A. J. Ph., Oct. 1877, p. 52.

Liquor Arsenicalis, B. P.—It is stated by a writer in "Med. Press and Circular," that a mistake occurs in the "British Pharmacopœia," on page 180, in the formula for "liquor arsenicalis," five *fluid ounces* of compound tincture of lavender being directed instead of so many *fluid drachms.* (This error is evidently corrected in "Pereira's Materia Medica and Therapeutics," abridged

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* The officinal formula works well, if the directions are explicitly followed. By a glass vessel is meant one suitable in capacity to the quantities of solids and liquid employed, and while a small flask might be used for the purpose, a test-tube of about 1 ounce capacity would naturally suggest itself to the operator as most convenient. Using such, the arsenious acid in fine powder, the bicarbonate of potassium in crystals, and the distilled water in the quantity directed, solution may be effected in a very short time and with less trouble than if the specific directions of the author are followed. While theoretically the quantity of bicarbonate of potassium is slightly deficient, in practice it is found sufficient. It certainly can be no improvement to supplant an agent that is readily obtained of definite composition, by one, the composition of which is liable to great variation.—Rep.

1872, p. 242, and in U. S. Dispensatory, 14th ed. (1877), p. 1307. (Rep.) New Rem., Aug. 1877, p. 254.

Liquid Rennet—Preparations.—F. Soxhlet communicates the following methods for preparing liquid rennet, using boracic acid and common salt, as preservative agent in the one, and substituting alcohol for boracic acid in the other.

Well-dried rennets—preferably 3 months old—are cut into shreds, rejecting the smooth portions. To 100 grams of the shredded rennet use 1 liter of water, 50 grams common salt and 40 grams boracic acid, and shake frequently for several days, keeping it at the ordinary temperature. 50 grams more of common salt are then added, and the mixture is then thrown upon a large filter, about 1 liter passing through a double filter, the full size of the sheet, in 2 days. For 1 liter of water used, about 800 cc. of liquid rennet is thus obtainable, which, when brought to the measure of 1000 cc., with a 10 per cent. solution of common salt (1 liter), will be of such strength that 1 part will coagulate 10,000 parts of milk, and will keep well. The filters becoming stopped up rapidly, they cannot be well used for the filtration of more than 1½ liters. The small quantity of boracic acid introduced into the milk does not in any way interfere with the manufacture of cheese. Alcohol may be substituted for the boracic acid, but in this event, the liquid rennet must be kept in well-closed bottles. The rennets are extracted with a 10 per cent. solution of common salt, in the manner above stated; after 5 days 9 per cent. (by volume) of alcohol is added, and the liquid filtered. The preparation keeps in well-closed bottles for a long time and has about the same strength (*i. e.*, 1 : 10,000) as that prepared with boracic acid. Ph. Central H., Dec. 13th, 1877, p. 425.

MISTURÆ.

Emulsions.—L. v. Cotzhausen has made some experiments with a view to determine the proper relation of gum to oil in making emulsions, and in what respect a variation in the manipulation might affect the product. Selecting cod-liver oil for his experiments, he obtained the following results:

1. fʒiv oil, ʒij gum arabic, fʒiv water; the oil and water poured on the gum in a mortar, triturated well for some minutes, and diluted with water to f℥v; a good emulsion, which remained unchanged for six weeks at a constant temperature of 70° F.

2. fʒiv oil, ʒij gum arabic, fʒiij dist. water, treated as above;

the result was the same. This is the favorite method of most German apothecaries, and is considered by them better and surer to bring success than the first. Emulsion of castor oil, turpentine (oil? Rep.), and copaiva, made in the same way, have kept well.

3. 4 p. oil, 1 p. gum, 3 parts water; made of cod-liver oil, castor oil, copaiva, and oil of turpentine respectively; an elegant emulsion, which, in the case of copaiva, separated after three days; in the case of cod-liver oil, after four days, castor oil, after six weeks, and the turpentine emulsion was unchanged at the date of the author's paper.

4. 8 p. oil, 1 p. gum, 6 p. water; with cod-liver, turpentine and castor oil, successful emulsions were obtained, which separated after twelve hours; copaiva could not be emulsionized in these proportions.

5. Equal parts of cod-liver oil and officinal mucilage of gum arabic formed a successful emulsion, when shaken well together in a bottle, and did not separate until after standing three weeks and two days.

6. f℥j cod-liver oil, the yolk of one egg, fʒvj dist. water, mixed intimately by trituration; a perfect yellowish-white emulsion, which, however, separated into two layers after seven hours.

7. Parrish's formula for cod-liver oil mixture (f℥vj oil, f℥ix lime-water, mixed by agitation), formed a satisfactory emulsion after considerable shaking, and remained unaltered for five days.

8. "Emulsions of cod-liver oil and lactophosphate of lime," when made by the formulas of Shinn, or Chiles (see Proceedings, 1873, p. 164), are very satisfactory preparations. A very acceptable preparation is also obtained by the author's formula, which is as follows: Cod-liver oil, f℥iv; powd. white sugar, powd. gum arabic, āā ℥ss.; oil of winter green, gtt. xxvi; oil of peppermint, gtt. vj; dist. water, f℥iv; make a thick mucilage with the gum, sugar, and a small quantity of distilled water, then gradually and carefully, with constant trituration, add the mixed oils and the balance of the water *alternately* (? Rep.). f℥ij of syrup of lactophosphate of lime are added to this quantity as wanted; by substituting syrup of the hypophosphites for the latter, the "emulsion of cod-liver oil with hypophosphites," prescribed much lately, is obtained. A. J. Ph., June, 1878, p. 284.

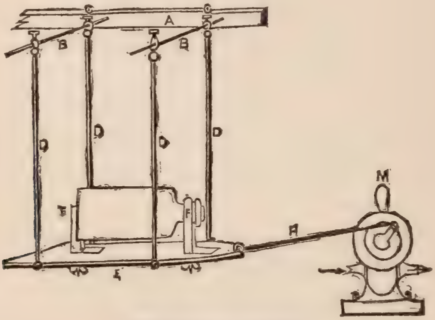
Emulsions.—A. F. W. Neynaber also offers some suggestions relative to the proper proportions of oil, gum arabic, and water, and the manipulations necessary to effect a good emulsion. Two modes of making emulsions of oils are in use. One method consists in making a thick mucilage, to which is added, in small portions, oil and water, until all is formed into a perfect emulsion, which may then be diluted with water. This method requires much skill and judgment, while the second method, that of mixing the oil and gum together—and then adding the water—is very readily carried out by even the unskilled, provided only that the ingredients are in the proportions given below, and that the weighings are exact. The proportions are as follows:

Oil.	Gum arabic.	Water.
1	1	1½
2	1	2
3	1	2½

These proportions are understood to be by weight, and, as already mentioned, must be quite exact to insure success. Drug. Circ., Nov. 1878, p. 179.

Emulsion Apparatus.—M. Alvergniat has contrived an apparatus for the preparation of the silver emulsion used by photographers, which may serve an equally good purpose for pharmaceutic emulsions. The apparatus (Fig. 39), is simple and may be cheaply constructed. Upon a flat rod of iron, *A*, 60 cm. long, 3.5 cm. wide, and 1 cm. thick, are riveted at right angles two rods of iron, *B B*, 1.5 cm. in diameter, and 35 cm. long, with spaces between them measuring 45 cm. The whole is fixed into a wall. On each of the rods is placed an iron ring, *C C*, provided with a screw, which serves to hold fast the ring at any point of

FIG. 39.



Emulsion Apparatus.

the rod. Each of the rings, or rather clamps, has attached an iron rod, *D D D D,* 85 cm. long, terminating at the bottom with a sort of eyelet. The four rods, *D D D D*, serve to support a little board of oak, *E*, 55 cm. long and 20 cm. broad, with supports, *F F*, so placed as to receive a bottle and fix it in a horizontal position. The whole system forms an articulated parallelogram which obeys the slightest movement. If a to-and-fro movement is given to the frame, the bottle moves forward and backward in a straight line, and thus the liquid contained is vigorously agitated. This movement may be imparted very easily by having resource to a little water-engine constructed on the Schmidt system (the model employed for sewing-machines), and which has sufficient power (a few kilograms). New Rem., Feb. 1878, p. 39; from Photographic News, 1877.

Emulsion of Oil of Turpentine.—Louis Genois has tried gum tragacanth, dextrin, starch, and castile soap for emulsionizing oil of turpentine, and has found the soap to be the best suspending medium. The smallest portion that will answer is 10 grains of soap to 1 ounce of oil. The soap is put into a round-bottomed mortar, the oil added by degrees with continual trituration; when well mixed it is transferred to a bottle, a half ounce of water is added, and the mixture vigorously shaken, after which a little more water is added and the mixture again shaken, when the emulsion is finished. It is very white and will not separate on the addition of a gallon or more of water. The soap should be perfectly dry and in very fine powder, otherwise it will not do so well. A. J. Ph., July, 1877, p. 345.

Mistura Guaiaci Viridis.—"B. H." communicates the following formula: Potass. iodid., ʒiij; tr. guaiaci ammon., f℥ijss.; aquæ, f℥iij; ext. dulcamar. fld., q. s. ad f℥viij. Dissolve the iodide of potassium in the water, add the tincture in portions, and shake well together until a clear green mixture has been produced, with separation of most of the resin. Then strain, and add the fluid extract. Dose, in gout and rheumatism, one to two teaspoonfuls. New Rem., Aug. 1877, p. 254.

Lycopodium Mixtures.—Hans M. Wilder finds that lycopodium may be mixed with water, if necessary, by first rubbing it under strong pressure (to powder it, as it were) before adding the water. A little alcohol (1: 16) much facilitates the rubbing, and dispenses with the extra pressure. The lycopodium has to be rubbed until it forms a granulous mass. A. J. Ph., Sept. 1877, p. 441.

Mistura Glycyrrhizæ Composita.—By the following formula a "Brown Mixture" is obtained, according to Ch. R (ice?)., which deposits no sediment: Mix 4 fl. ozs. glycerin and 2 fl. ozs. of fluid extract of liquorice, then add 2 fl. ozs. tr. opii camphor., 1 fl. oz. vin. antimonii and ½ fl. oz. spts. ætheris nitrosi, and finally 6½ fl. ozs. syrup. The mixture is dichromatic, appearing brown and opaque by reflected light, but clear and reddish by transmitted light. New Rem., Sept. 1877, p. 286.

Gentian and Rhubarb Draught.—This preparation, officinal in the "Pharmacopœia of St. Bartholomew's Hospital," together with the "alkaline colombo draught" given below, is said, by Dr. T. Lander Brunton, to "work wonders" in cases of chronic gastric catarrh with flatulence. The formula is as follows: Infus. rhei, f℥ss.; tinct. gentianæ, ♏xx; sodii bicarbonat., gr. x; spir. chloroformi, ♏x; aq. menth piperitæ, ad f℥j. The

Alkaline Colombo Draught is made by dissolving 10 grs. of bicarbonate of soda in a mixture of 30 min. of tincture of orange-peel and sufficient infusion of colombo to make f℥j. When given before meals, the alkali stimulates the secretion of gastric juice, while the bitter is supposed to lessen the secretion of mucus. New Rem., Jan. 1878, p. 13.

Mistura Antipruritics, Scholz.—This is prepared from tincture of caladium sequinum (which see), as follows: ℞. Tinct. caladii sequini, 0.6–1.5 gram (16 to 40 drops); aquæ destill., 150 grams (5 fl. oz.); syrupi, 30 grams (6 drach.). M. A tablespoonful every hour. New Rem., April, 1878, p. 112.

Russian Cholera Drops.—The following formula is communicated to J. de Ph. et de Chim. (1877, p. 424), as an excellent remedy to relieve the persistent vomiting in cholera: ℞. Tinct. valerianæ æther., 8 grams; vin. ipecacuanha, 4 grams; laudan. liq. syden., 1.3 grams; ol. menth. pip., gtt. 5. M. Zeitsch. Œst. Ap. Ver., Dec. 10, 1877, p. 577.

PILULÆ.

Pills.—C. Symes contributes an interesting paper on pills and pill coating, in which he gives some interesting practical hints relative to excipients and pill-making generally, and reviews the various forms of coated pills. Among others, he describes a method of pill-coating with French chalk,* which he adopted as early as 1860, and finds it to furnish an excellent coating. The pills are varnished by rolling in an ethereal tincture of tolu, and while still moist are transferred to a box containing finely powdered French chalk, then turned on a warm pill tray and kept rotating for a short time; finally, they are polished with *slight* pressure. At this stage the pills have a steel-gray appearance and smooth surface. They are now placed in a covered pot, and are moistened with syrup, mucilage, or a mixture of the two; when evenly covered they are transferred to a box containing French chalk, or a mixture of it and finely powdered sugar, well shaken, and again transferred to a warm pill tray, kept rapidly rotating until dry and smooth; the operation taking but a comparatively short time. Well covered in this way they will keep good for years. The author has examined specimens of pills thus coated more than four years ago, and found them less hard than they would have become in as many weeks if left exposed as these had been and uncoated. There is a drawback to this covering, however, in the case of pills containing essential oils; the oil dissolves some of the coloring matter of the pill, and takes it through the coating, which then becomes yellow or brown and unsightly. Ph. J. Trans., Dec. 15th, 1877, p. 461.

Pill-coating.—Some interesting remarks on pill-coating were also made by E. S. Bull before the London Chemists Assistant's Association. They are recorded, and will be read with profit in Drug. and Chem., May, 1878, p. 205.

Elastic Gelatin Capsules.—Detenhoff recommended to prepare them from 1 p. gelatin, 4 water, and 2 p. glycerin; these become opaque as the water gradually evaporates. A better formula is the following: 1 p. gelatin, 2 p. water, and 4 p. glycerin; soak the gelatin in the water, dissolve with gentle heat, add the glycerin, and evaporate until 5 parts remain, so that all the water is evaporated; into this mass dip the moulds, and proceed as usual. A. J. Ph., June, 1878, p. 295; from Ph. Zeitschr. f. Russ., March, 1878.

Pill Excipient.—Canada balsam, mixed in the proportion of 3 parts to 1 part of wax, is proposed by Dannecy as an excipient for pills. It prevents the pills from becoming hard and insoluble, and has also the advantage of being well adapted for deliquescent substances, like acetate of potassium, which are well preserved thereby for an indefinite period. A. J. Ph., Sept. 1877, p. 448, from L'Union Phar., 1877.

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* See also an extract from J. A. Cope's paper, on the same subject, in Proceedings, 1875, p. 82.

Tragacanth Excipient—A new excipient for pills.—G. Welborn, drawing attention to the various altered conditions developed by age in some of the official (Br. Ph.) and other pill masses, recommends the following excipient, by the application of which these changes (such as softening, drying, granulation, etc.) may be obviated: Gum tragacanth, in powder, ½ oz.; glycerin, water, of each 2¼ oz.; oil of pimento, gtt. v. Mix. The product will keep good for several years in an ordinary covered pot. When this excipient is used there is but rarely the slightest tendency to adhesion between the mass and the pill mortar, consequently there is no loss of material. The advantages possessed by it are summarized by the author as follows: The small quantity necessary to effect the desired purpose; the facility with which it mixes with dry powders; its cleanliness; and its efficiency as a preservative. Yearbook of Ph., 1876, p. 522.

Sugar-coated Pills.—E. M. Wells has examined some sugar-coated pills, representing a large lot received from a New York manufacturer. Among them some compound cathartic pills attracted attention on account of their small size, and when deprived of their coating of sugar, they were found to weigh, on an average, 44 per cent. less than they should have weighed if made officinally. Cook's pills and so-called improved compound cathartic pills were *only* 33 per cent. short in their represented weight. A. J. Ph., Jan. 1878, p. 23.

Compound Cathartic Pills—Remarks on Ingredients, Preparation and Gelatin Coating.—G. H. Chas. Klie communicates his experience wth the preparation of these pills, and reviews the character of the ingredients that enter into their composition, their cost, etc. His experience with the preparation of *extract of colocynth* leads him to suggest its preparation with alcohol, sp. grav. 825, in place of diluted alcohol, and proceeding somewhat differently from the Pharmacopœia in the extraction of the pulp. From 48 troy ounces of colocynth—medium-sized fruit—he obtained 15 troy ounces of pulp, which was ground tolerably fine, macerated for 5 days with 4 pints of alcohol, and expressed; yielding

3½ pints of expressed liquid, and this 3 troy ounces of dry extract. The expressed mass was packed into a percolator, and 5 pints of diluted alcohol (partly prepared from the alcohol recovered) were poured on; 3 pints of percolates were obtained, the dregs yielding 1½ pints more, making 4½ pints of tincture with diluted alcohol, which yields 2¼ troy ounces of extract, and making 5¼ troy ounces from 15 troy ounces of pulp (or 48 troy ounces of fruit). The extract was easily pulverized in a flat-bottomed porcelain mortar. The U. S. Ph. directs maceration of the pulp from 48 troy ounces of the fruit for 4 days in 8 pints of diluted alcohol, expression, and percolation of the residue with diluted alcohol, to make 8 pints more of the percolate. The yield is stated to be 7 ounces, which the author considers too high for the drug of average quality. From 48 troy ounces of fruit, which yielded 16 troy ounces of pulp, after more thorough exhaustion than is designed by the Pharmacopœia, he obtained 6 troy ounces of dry extract. Accepting the statements of Mohr for the yield of extract from colocynth pulp by the process of the Prussian Pharm. (directing alcohol, sp. gr. 0.894 — 0.890), and Dr. Hager's statement regarding the preparation of the German Pharm. (directing alcohol, sp. gr. 0.893 — 0.892), the yields, as respectively claimed by these authorities and found by the author, would be as follows:

Process, .	U. S. P.	Ph. Bor.	Ph. Germ.	Author's Make.
Yield, . .	46.6	14.5	28.46–40.0	35.0–40.0 per cent.

Of the other ingredients of the *compound extract of colocynth*, the author says nothing that does not readily present itself to those that are in the habit of making this preparation. The mixing of the ingredients is best accomplished by passing through a sieve, placing the powder in a bottle, which it will half fill, and shaking for a minute or two. It ought to be kept in sealed bottles and in a cool place; has a tendency to cake in common extract jars; turns several shades darker by keeping, and is, when officinally prepared, infinitely superior to some of the commercial extracts. At present prices, the compound extract costing $3.25, it can be made to cost about $2.85, not counting labor or fuel.

Regarding the second ingredient in the compound cathartic pills, *extract of jalap*, the author observes, that when it is, as directed by the Pharm., "evaporated to the proper consistence," which implies a pilular consistence, it will lose about 52 grains per troy ounce. The other ingredients can be procured, of excellent quality, in the market.

The perfect round form of the pills is somewhat difficult to preserve. In warm weather they become flat, and when kept in a bottle, where they press one on another, assume irregular shapes. (In a note to the author's paper, Prof. Maisch observes, that the mass is most readily made in a hot iron mortar, using *very little* water, and rolling out the mass while warm. If too much water is used, the pills will flatten on keeping.) The author, furthermore, gives some practical hints on *gelatin-coating* these pills, whereby, he states, they may be kept perfect in shape and therapeutic qualities. The solution of gelatin used is made from 1 part of gelatin in two parts of water, and it should be maintained at a temperature of 140° – 150° F. during the dipping, the evaporating water being made up from time to time. After dipping the pills, attached to the ends of needles, as has been described by others, the pills are turned backwards, and forwards, and sideways, so as to distribute the solution equally, until the gelatin solution has slightly congealed. A single dipping is generally sufficient, although from 4 to 6 per cent. may require a second dipping. A. J. Ph., April, 1878, pp. 162, 168.

In connection with the above paper, Prof. J. M. Maisch draws attention to the importance of employing purified aloes. Occasionally samples of very pure aloes are obtainable, but in his experience he has found 3342¼ lbs of air-dry Socotrine aloes, purified in different lots, to lose 478½ lbs., or 13.42 per cent., a good portion of which consisted of the impurities, such as vegetable fragments, stones, goatskins, and the like. Regarding the preparation of extract of colocynth, he draws attention to the difficulty attending the removal of the seeds from the colocynth. This is so great that the manufacturer does not attempt it, but simply crushes the fruit, with the precaution not to break the seeds. Thus prepared and treated with the officinal menstruum, 3460½ lbs. of commercial colocynth, of average good quality, have yielded 495½ lbs. of dry extract, equal to 14.32 per cent.

Dr. Squibb, in 1857, reported a yield of 20.6 per cent. from completely dry colocynth.

Quinia Pills.—James E. Brett states, that if a little gum arabic be added to the quinia (sulphate ?), and glycerin then added in small quantities at a time, an excellent mass will be formed, which can easily and leisurely be worked into nice smooth and compact pills. A. J. Ph., April, 1878, p. 162.

Quinia Pills and Pill Excipients.—Referring to Mr. Brett's communication on the use of gum arabic and glycerin as an excipient for quinia pills, A. Nicklès, of Benfeld, Alsace, communicates the following precise formula, which, he states, will produce an excellent and unalterable mass: ℞. Chinini sulfurici, 30 grams; gum arab. pulv., 5 grams; glycerini, 10 grams.

In this connection, also, T. A. Cheatham suggests that an excipient made by triturating powdered tragacanth with sufficient glycerin to form a thick paste, is better than the gum arabic and glycerin, and is, moreover, generally applicable to making pill masses.

Another pill excipient, suitable for the most refractory pill masses, is proposed by J. J. Brown. It is made by triturating ℥ss. powdered starch, ʒj powdered sugar, and ʒij powdered tragacanth with ʒij water and ℥iv glycerin, and heating the mixture in a porcelain capsule until the starch-granules are ruptured. The jelly-like substance formed has been found to keep well in the climate of California. A. J. Ph., June, 1878, p. 284.

Copaiva Pills.—Hans M. Wilder finds, that if an equal part of copaiva and calcined magnesia are used, copaiva pills may be readily made at once from the oleo-resin. The addition of water, in proportion of one drop to each drachm of copaiva, facilitates the solidification. The author also draws attention to Hager's method (recommended in his "Praxis") for preventing copaiva pills from becoming too hard: 200 copaiva, 20 beeswax, 10 calcined magnesia, and 2 water are incorporated, and the mass divided into pills of suitable size. Mr. Wilder has recently had occasion to make "copaiva suppositories," and succeeded well by melting 3 parts of beeswax and adding 1 part of copaiva. The mass formed was plastic and none too hard. A. J. Ph., Sept. 1877, p. 441.

Phosphorus Pills.—Thomas Haffenden recommends the following method for making phosphorus pills, by which the use of any greasy or oily preparation is avoided, while the process requires very little more time than that of making ordinary pill masses, and secures a perfectly satisfactory phosphorus pill: A small quantity of mucilage (Br. Ph.) is placed into a porcelain cup, which is then placed into a saucer containing cold water; heat being applied to the saucer, the proper degree is soon attained, the phosphorus melts, and on being stirred forms quite an emulsion with the mucilage. The cup is then immediately removed from the saucer, and the powder to form the pills rapidly but carefully stirred in with a small spatula, care being taken to keep the mass together while doing this, otherwise, if spread on the warm sides of the cup the phosphorus is apt to catch fire. When well mixed together the mass may be transferred to a mortar and worked up in the usual way. The pills may then be coated. The secret of successfully coating is to varnish, first rendering the pill partially water proof; then it is simply a question of manipulation to get a pearl-like covering with the mucilage and French chalk. Yearbook of Ph., 1876, p. 524.

Phosphorus Pills.—A. F. W. Neynaber observes, that the use of solvents—bisulphide of carbon or chloroform—for making pills of phosphorus has some disadvantages. The bisulphide of carbon vaporizes incompletely and is apt to impart odor to the pill; moreover this, as well as the chloroformic solution, is liable to separate the phosphorus in small grains instead of minute division, if the temperature at which the mass is worked is 108° or above. He recommends that the phosphorus be melted under water, and then sufficient flour stirred in to make a stiff paste, with which the melted phosphorus mixes readily and may be minutely divided with the pestle. Drug. Circ., June, 1878, p. 102.

Pills of Ferrous Chloride.—(Formula of the Paris Pharmaceutical Society.) Dry ferrous chloride (see Syrup of Ferrous Chloride), powdered marshmallow, each 10 grams; mucilage sufficient. Make into 100 pills, which are to be silvered. A. J. Ph., July, 1877, p. 349.

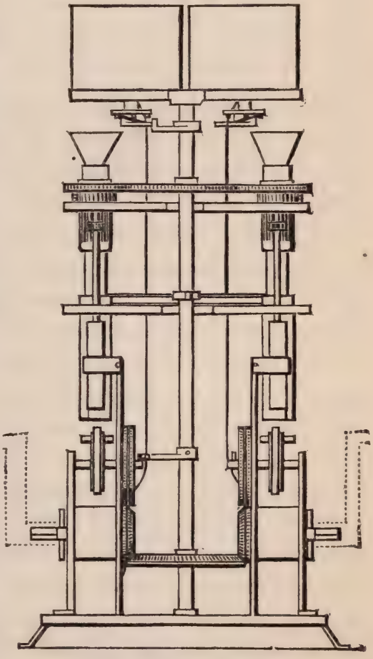
Blaud's Pills.—The formula for these ferruginous pills is not generally known. "New Rem." (April, 1878, p. 125) gives the following, communicated by a correspondent to the "Pharm. Zeit.:" Sulphate of iron, exsiccated, 154 grains; carbonate of potassium, 230 grains; powdered marshmallow root, 30 grains; honey, q. s. Make into 120 pills. The carbonate of potassium having been rubbed in a mortar, the other powders are successively added. The honey must be added cautiously, as one or two drops in excess make the mass too damp, and necessitate an increased size of the pills, by the addition of more powdered marshmallow root. (See also Proceedings, 1873, p. 175, and Am. Jour. Ph. 1871, p. 307.)

Ricord's Cough Pills.—The following formula is given in "New Rem." (Sept. 1877, p. 286): Morphiæ hydrochloratis, gr. v; extract. hyoscyami, gr. viij; rad. belladonnæ pulv., rad. glycyrrhizæ pulv., mellis, āā gr. xlv; bals. tolutani, ol. theobromæ, āā gr. lxxv. Make into 100 pills. Each contain 1-20 grain of hydrochlorate of morphia. The dose is one pill every 5 or 6 hours in chronic bronchitis accompanied with cough.

PULVERES.

Seidlitz Powder Machine.—Charles R. Doane, of Brooklyn, is the inventor and patentee of a machine (Fig. 40) for putting up Seidlitz and other powders with great exactness, neatness and rapidity; its capacity, when run at a moderate rate of speed, is five hundred powders per hour. The powder in bulk is placed in the receptacles on top of the machine—the acid on the left and the alkali on the right—from whence it is discharged by appropriate measures through the funnels below into papers made ready to receive it by the mechanism at the base. The whole operation of measuring, depositing, folding, pressing, and discharging, is accomplished by a half-revolution of the perpendicular shaft, and the powders are cast out—the white to the left and the blue to the right—ready for boxing. A point of considerable importance is, that each powder is enveloped in two thicknesses of paper, thereby preventing deliquescence of the acid powder, and yet no more paper is used than for single thickness in handfolding—the paper used for the fold in the old method furnishing the outer wrapper in this. A device beneath the bedplate provides for the application of power, if desired. New Rem., Aug. 1877, p. 231.

FIG. 40.



Seidlitz Powder Machine.

Pulvis Doveri Saccharatus.—Dr. Henry G. Pifford recommends this as a substitute for the officinal Dover's powder, over which, in his opinion, it has some advantages; the taste being more agreeable, while uniformity in strength is secured. Take of opium (assaying 10 per cent. of morphia), 1 part; ipecacuanha, 1 p.; sugar of milk, 8 parts. Misce et tere bene s. a. New Rem., March, 1878, p. 76.

Effervescing Carbonate of Lithium.—(Formula of the Paris Pharmaceutical Society.) Take of citric acid, 40 grams; bicarbonate of sodium, 50 grams; and carbonate of lithium, 10 grams. Powder and mix well, then introduce in a wide flat-bottomed dish, and heat to about 100° Cent. (=C 212° F.), stirring constantly until the powder becomes granular. Separate the granules of uniform size by means of appropriate sieves, and preserve them in well-stoppered bottles. A. J. Ph., July, 1877, p. 351.

Wafer Capsules.—J. C. Wharton suggests small cones of paper for filling wafer capsules, whereby comparatively large quantities of powder may be placed upon the wafer with ease and cleanliness. The cones are made of paper or thin metal, and may be attached to a small handle of wood.

Wafer Capsules.—(Application for the administration of Castor Oil, Copaiba, etc.) Limousin proposes to use wafer capsules for this purpose. Two wafers are united, except on one portion of the rim, through which opening the liquid is introduced by means of a pipette, or the oil is placed upon one wafer, its viscosity preventing its spreading to the margin before the other wafer is rapidly affixed in the usual manner. The substance of the wafer is soon saturated by the oil, and is then less readily softened by the water, while the finely divided oil is apt to turn rancid; wafer capsules filled with castor oil should, therefore, not be kept on hand, except for a short time. Cod liver oil will communicate its odor to the capsule, and is, therefore, not adapted, unless the inner surface of the wafer is first covered with collodion, in which case it becomes less readily disintegrated. A. J. Ph., Sept. 1877, p. 445, from Rép. de Pharm., 1877.

Fumigatory Powder and Paper.—Boutigny gives the following formula: Bisulphite of potassium, 5 p.; nitrate of potassium, 4 p.; peroxide of manganese, q. s. to blacken the mixture. Pulverize separately and mix carefully. When fumigation is required, throw a few grams on a red-hot shovel. An agreeable odor is afterwards produced by burning paper, made as follows: One part of nitrate of potassium and two parts of sugar are dissolved in six parts of water; unsized paper is plunged into this solution and dried. New. Rem., April, 1878, p. 125.

RESINÆ.

Scammony Resin—New Method of Extracting.—Emil Perret exhausts the crude pulverized scammony with boiling alcohol, and neutralizes the dark alkaline liquid with a few drops of sulphuric acid. The coloring matters are precipitated as a lake, and the clear supernatant liquid is filtered off; the alcohol is distilled off, and the residual pure resin is dried on a sand-bath, raising the temperature gradually to 104° C. (= 219.2° F). A. J. Ph., Feb. 1878, p. 69; from Chem. News, Dec. 21, 1877.

Resina Podophylli.—G. H. Chas. Klie has made some experiments with a view of determining the most profitable solvent and precipitating mixture. Using alcohol of different strengths, from dilute upwards, 1½ pint of percolate was obtained from 16 troy ounces of the powder in each case, and the tincture remaining in the mass was then displaced by water, thus generally increasing the percolate to two pints. When dilute alcohol was used for exhaustion, in the subsequent process of concentration the resin would separate, and had, therefore, to be redissolved in alcohol before precipitation. None of the products would be entirely redissolved by the original menstruum, nor in alcohol of any other strength. The following table shows the results:

Sixteen troy ounces of Podophyllum root exhausted with alcohol.	Precipitated in	Weight of product.	Color of Product.
sp. gr.		grs.	
.825	6 drachms of muriatic acid to 4 pints of water.	236	Like liquorice root powder.
.825	½ oz. of alum to 4 pints of water.	223½	Greenish-yellow.
.825	2 drachms of muriatic acid to 4 pints of water.	222	A trifle lighter than powdered ipecac root.
.825	4 pints of water.	223	Like powdered ipecac root.
.930	½ oz. of alum to 4 pints of water.	557	Greenish-yellow.
.938	6 drachms of muriatic acid to 4 pints of water.	340	Like powdered liquorice root.
.938	2 drachms of muriatic acid to 4 pints of water.	352¾	Brownish-yellow, with a tinge of green.
.938	4 pints of water.	352	Darker than powdered scammony.
.945	½ oz. of alum to 4 pints of water.	243½	Like powdered extract of liquorice.
.945	80 minims of muriatic acid to 4 pints of water.	244	A trifle lighter than common emery flour.
.945	4 pints of water.	246	Same as foregoing.

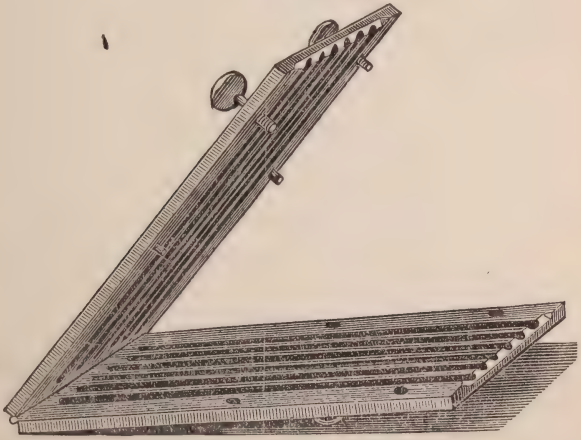
A. J. Ph., Dec. 1877, p. 577.

Podophyllum Resin.—In the Br. Pharm. this resin is described as "a pale greenish-brown amorphous powder." In commerce it is found to vary much in color, from different shades of yellow to brown and green, and Dr. A. Senier and A. J. G. Lowe have, therefore, undertaken to determine whether this difference in color indicates difference of composition or of strength, and whether it is admissible to use specimens different in color to that described in the Pharmacopœia. The author examined these commercial specimens of the resin, one of which was deep orange-brown, the second chrome yellow, and the third bright lemon-yellow in color, and found that by fusing the first in water and coarsely pounding, a dark-brown powder was obtained, which, when thoroughly triturated, finally became light yellow; the second and third resins, treated in the same way, gave precisely similar results, the coarsely powdered fused resins being dark brown, and becoming pale yellow by continued trituration. It was noticed that the first specimen was about twice the density of the second commercial specimen; this was also found to be the case with the resins which had been fused. It was furthermore found, that when the properly concentrated alcoholic solutions of the first commercial resin were precipitated, under continuous stirring, in quantities of *pure water*, varying between 2 and 20 times the volume of the solutions, and the precipitates were well washed and dried over sulphuric acid, the products were not only of a light-yellow color, but they were also of light density and identical in these respects to the second commercial specimen; if, on the other hand, the alcoholic solution of the second commercial specimen was precipitated in 2 volumes of *acidulated water*, the product became both heavier and darker, and corresponded to the first specimen. Further experiments made with tincture of May apple root, concentrated to the requirement of the B. P., confirm the observation made with the commercial resins. The products obtained with pure water in any proportion, or with acidulated water when 10 volumes or more are used, are always light both in color and density; while the products obtained with two and three volumes of acidulated water (the latter being the quantity of the B. P.), are always dark and heavy. They have never succeeded in obtaining the color described by the Pharmacopœia, and they conclude that the variations in the shade observed in the commercial resins are due to a variation in the size of the resin particles, and hence also the difference in the density. The authors also confirm the observation previously made by several writers that washing with water deepens the color of the resin, and attribute this to partial fusion and agglomeration of the particles. In regard to the presence of berberina, to which several writers attribute the yellow color of the resin, the authors have been unable to find any, and contend that there are at least some specimens of the resins, the yellow color of which is not due to berberina. They confirm the statement of Maisch, that alum-water gives a bright-yellow resin, but find it increases the ash. Ph. J. Trans., Dec. 8th, 1877, p. 443.

SUPPOSITORIÆ.

Soluble Medicated Bougies.—C. L. Mitchell prepares these bougies, using for their composition a mixture of glycerin and gelatin, similar to that mentioned by Prof. Parrish in the "Am. Jour. Phar." for April, 1872, p. 188.* The mass made in this manner is suitably medicated, and then while hot poured into moulds, which are represented by Fig. 41. These are made of two plates

FIG 41.



Mould for Bougies.

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* Mr. Henry B. Brady first called attention to this form of "Medicated Bougies," at the meeting of the Association in St. Louis (see Proceedings, 1871, p. 85), and the material recommended by Professor Parrish is that then recommended by Mr. Brady, and is composed as follows: 3 p. gelatin, 7 p. glycerin, and 1 p. alcohol. The gelatin is first treated with a small quantity of water till dissolved, the glycerin and alcohol are added, and the evaporation continued.—REP.

of brass, hinged together at one end, and with corresponding grooves cut into them so as to make a long, thin cylinder of about the calibre of a No. 8 bougie. When the composition has cooled, the bougies are removed from the mould and laid on wooden trays, which are kept in a dry atmosphere, ranging from 70° to 80° F., for about two days, when they are scraped to remove rough edges, left by the joints of the moulds, and the rough ends trimmed off. They will dissolve in water of 100° to 103° F., in from 10 to 15 minutes, and in the urethra in from 1 to 3 hours; are readily introduced either by dipping in water or slightly oiling them, and are quite flexible and elastic, being readily tied into a knot and untied again. The author reviews the character of some of the medicated bougies—proprietary—of commerce, over which the bougies prepared by his method possess decided advantages. A. J. Ph., March, 1878, p. 108.

Pessaries.—Duquesnel observes that pessaries intended for the neck of the uterus are usually made by incorporating the medicinal agent—tannin, alum, oxide of zinc, etc.—with gum arabic, bread, etc., and finds the brittleness of the pessaries so constructed an objection. He finds gutta-percha to be an excellent excipient, which communicates to the pessaries sufficient toughness and elasticity. The pessaries are made as follows: An iron or brass mortar is heated to about 100° C. (=212° F.), equal parts of gutta-percha and the medical agents are introduced, well mixed with the pestle, and the mass rolled into cylinders of suitable size on a warmed glass or metallic plate. When these come in contact with the mucous membrane, they give off a portion of the medicinal agent incorporated in them. Schweiz. Wochenschr., f. Ph., July 6th, 1877, p. 215.

SYRUPS.

Syrup of Orange-peel.—C. S. N. Hallberg recommends its preparation from the fresh rind, from which all the white tissue has been carefully removed, by a method similar to that of the Swedish Pharm. 3 ozs. of the yellow of orange-peel and 8 ozs. of rock candy are contused together in a marble mortar until a paste is formed, and then set aside for 24 hours; 20 troy ounces of sugar are then dissolved in a pint of hot water, the hot syrup added to the previous mixture, well stirred and allowed to macerate 24 hours in a covered vessel, and finally strained.

A very good preparation may also be obtained from the oil, provided this be nice and fresh. Take of spirit of orange (1 × 16), 1 oz.; carbonate of magnesium, 2 dr.; water, 1 pint; sugar, sufficient to make 2 pints; proceed as for syrup of tolu. The Pharm., June, 1878, p. 162.

Syrup of Orange-peel.—A. Martin obtains an excellent product by drying the orange-peel, preferably the kind known as Curaçoa, occurring in bands, by inclosing it in a tinned iron can containing a bottle half filled with burned lime, and luting the cover of the can with flour paste and paper. After remaining for eight days in this desiccator the orange-peel is dry enough, without having lost any of its aromatic principles, to be easily reduced to powder; this is then exhausted by percolation with water at the ordinary temperature, and the infusion heated to about 70° C. (= 158° F.), to coagulate the albumen, filtered and converted into syrup in the usual manner. A. J. Ph., Dec. 1877, p. 598, from Jour. Phar. d'Anvers, 1877.

Syrup of Ipecacuanha.—A. Martin proposes to prepare this syrup from the hydro-alcoholic extract of ipecacuanha, by dissolving it in water and evaporating the solution again to an extract containing 15 per cent. of moisture. A syrup corresponding to the requirements of the Belgian Pharmacopœia is obtained by dissolving 1.50 grams of this aqueous extract in sufficient warm simple syrup to obtain 1000 grams. The advantages of the process are exact and uniform strength, recovery of all the alcohol, and easy preservation without becoming mouldy like the simple alcoholic extract. A. J. Ph., Dec. 1877, p. 598, from Jour. Phar. d'Anvers, 1877.

Syrup of Ipecac.—J. B. Moore recommends the following formula, which produces a permanently clear syrup: Moisten 2 ozs. troy of ipecac, in powder No. 60, with alcohol, pack it firmly in a cylindrical glass percolator, then gradually pour upon it, first, two fluid ounces of alcohol. When this has been absorbed, pour on gradually eight fluid ounces of a mixture, consisting of two parts of alcohol and one part of water, and when this has all passed from the surface, continue the percolation with diluted alcohol until ten fluid ounces have been obtained, observing to set aside in a plate or shallow dish, in a warm place, the first two fluid ounces which pass, that they may evaporate spontaneously to a syrupy consistence. Then mix one fluid drachm of acetic acid with the remainder of the percolate, and evaporate carefully on a water-bath, with frequent stirring, until reduced to two fluid ounces and a half; add to this the reserved portion, mix the whole with ten fluid ounces of water, and continue the evaporation until the mixture is reduced to twelve fluid ounces. Filter when cool, pass water through the filter to make twelve fluid ounces. Pour this filtrate upon eighteen troy ounces of sugar contained in a bottle, and dissolve by agitation; finally add eight fluid ounces of glycerin, mix, and strain though muslin.

Syrup of Senega, that, like the above, has kept perfectly clear for seven or eight years, is obtained by the author as follows: 4 troy ounces of senega, in powder No. 30, are moistened with 2 fluid ounces of diluted alcohol, allowed to stand covered for six hours, packed into a percolator, percolated until one and a half pints of tincture are obtained, or until the drug is exhausted, evaporated carefully, at *not exceeding* 140° Fahr., to six fluid ounces, allowed to cool, filtered, and brought to six fluid ounces through the filter. The filtrate is now poured on nine troy ozs. of sugar contained in a bottle, shaken frequently during twenty-four hours, slightly heated in water to effect complete solution of the sugar, if necessary, and then mixed with four fluid ounces of glycerin and strained. Drug. Circ., July, 1877, p. 114.

Compound Syrup of Sarsaparilla.—W. C. Schiller proposes the following formula for a "fluid extract," which, when mixed with simple syrup in the proportion of 4 parts to 12, furnishes an excellent comp. syr. of sarsaparilla: Sarsaparilla root, 24 ozs.; pale rose, Alexandria senna liquorice-root, each 2 ozs.; oil of sassafras, 5 min.; oil of anise, 5 min.; oil of wintergreen, 2 min.; glycerin, 4 ozs.; diluted alcohol, a sufficiency. The drugs, in moderately fine powder, are moistened with 8 f. ozs. of diluted alcohol, allowed to swell for twelve hours, packed into a percolater, and percolated until 24 f. ozs. of reserve and 32 fld. ozs. of second percolate are obtained. The residue is then expressed, the expressed liquid and glycerin are mixed with the second percolate, the mixture is evaporated to 8 f. ozs., and this is then mixed with the reserved portion. The essential oils, dissolved in a little alcohol, are then added to the whole, which is shaken repeatedly during twenty-four hours, and then filtered.

The author is of the opinion that the presence of guaiacum-wood is not necessary and renders the preparation inelegant in appearance. Drug. Circ., May, 1878, p. 86.

Syrupus Lactucarii.—A. G. Schlotterbeck has made some experiments, from which he concludes that the turbidity of this syrup, when made by the process of the Pharmacopœia, is due to an excess of one or more of the acids contained in that substance, and he finds that the addition of liquor potassa to neutral reaction will render the syrup not only permanently clear, but will also change the taste from an acrid bitter to a sweetish and very slightly alkaline. He mentions among the acids that may be present, according to accepted analyses, pectic, malic, oxalic, and citric. Prof. Maisch, in this connection, draws attention to the fact, that Aubergier already observed that the bitter taste of lactucin is destroyed by alkalies and not restored by acids. The bitter principles of lactucarium are *lactucin*, *lactucic* and *lactucopicrin*, the first-named being present in larger quantity. The syrup, modified as above suggested, should, therefore, be carefully tested for its medicinal properties before it is substituted for the officinal syrup. A. J. Ph., Dec. 1877, p. 579.

Aromatic Syrup of Liquorice.—A. S. communicates the following formula for an aromatic syrup of liquorice, which he finds to disguise the taste of quinia better than simple syrup of liquorice-root or extract, or the aromatic elixir of liquorice: Reduce 2 ozs. each of ginger and cinnamon-bark, and 1 oz. of cloves, to a coarse powder, and boil in two pints of water over a slow fire for one hour. Then strain and dissolve in the liquid 4 ozs. of pulv. extract of liquorice. When dissolved, add 60 troy ounces of sugar, keeping the heat up until the latter is dissolved. Then strain while hot, and add hot water enough to make 4 pints of finished syrup. The syrup is stated to have a pleasant flavor, and none of the often objectionable sweetness of liquorice. Prof. Maisch, commenting on this formula, suggests some improvements from a pharmaceutical standpoint. A. J. Ph., Dec. 1877, p. 578.

Syrup of Coffee.—50 grams of ground roasted coffee are extracted by percolation with water until 400 grams of infusion are obtained. The infusion is poured upon 700 grams of sugar, contained in a funnel loosely stopped with a sponge, and the orifice of which is completely stopped by a cork. When the greater part of the sugar is dissolved, the cork is removed, and the syrup allowed to flow slowly through the sponge. Zeitschr. Œst. Ap. Ver., No. 4, 1878, p. 61.

Syrup of Tar.—(Formula of the Paris Pharmaceutical Society.) 15 grams of tar (see Tar-water) and 30 grams of pinewood sawdust are mixed, and digested at 60° C. (= 140° F.) with 1000 grams of water, with occasional agitation. Filter at the end of two hours upon the sugar, 190 grams of which are to be used for every 100 grams of filtrate, and effect the solution in a closed vessel, heating it by means of a water-bath.

Syrup of Narceina.—Dissolve 1 gram of narceina in 100 grams of water, containing 0.6 gram hydrochloric acid; add to the solution 250 grams of water, and then dissolve 650 grams of white sugar. Each tablespoonful of 20 grams contains 0.02 gram (⅓ grain) of narceina. A. J. Ph., July, 1877, p. 350 and 351.

Syrup of Narceina is recommended to be prepared, by the Pharm. Society of Paris, as follows: Narceina, 1 gram; water, containing 6 grams per liter of HCl, sp. g. 1.16, 100 grams; water, 250 grams; sugar, 650 grams. Dissolve the narceina in the acidulated water with heat, add the other water and the sugar so as to form a syrup. New Rem., Aug. 1877, p. 254.

Syrup of Butyl (Croton) Chloral.—The following formula is given in "New Rem." (April, 1878, p. 126): Butyl-chloral, 2 grams; warm glycerin, 6 grams; extract of liquorice, 4 grams; distilled water, 43 grams; syrup, 45 grams. The preparation contains 2 per cent. of butyl-chloral.

Syrup of Ferrous Chloride.—(Formula of the Paris Pharmaceutical Society). Dissolve 5 grams of dry ferrous chloride in 20 grams of orange-flower water, and add 800 grams of syrup of gum and 175 grams of syrup of orange-flower. The *dry ferrous chloride* is obtained by dissolving iron in hydrochloric acid and evaporating the filtered solution rapidly to dryness.

Syrup of Chlorhydro-phosphate of Iron is made from 5 grams each of ferrous chloride and medicinal phosphoric acid; 350 grams of distilled water; 640 grams of sugar. A. J. Ph., July, 1877, p. 349.

Syrup of Iodide of Iron—Action of Nitric Acid.—Referring to the observation, communicated to the Association at the last annual meeting by L. Myers Connor (see Proceedings, 1877, p. 411), that syrup of iodide of iron had been found in commerce colored green with anilin, and that this color was discharged on the addition of a few drops of dilute nitric acid, while the natural green color was not, Herman Betz communicates the result of some experiments, which appear to prove the fallacy of the test given. Anilin green mixes well with syrup; if a small quantity of sample syrup is colored by it, the color will be destroyed by nitric acid, but not by dilute nitric acid U. S. P. But if nitric acid is added to syrup of iodide of iron so colored, a dense black mixture results, from which the iodine may be separated by filtration, and this reaction is in no way distinguishable from that of the pure syrup of the iodide. Dilute nitric acid is not available, because it does not destroy the green color of the anilin. A. J. Ph., Dec. 1877, p. 581.

Syrupus Ferri Phosphatis, C., Quinia et Strychnia.—George Masson, after reviewing various formulas for the preparation of this syrup, proposes the following, by which a colorless syrup is readily obtained of full strength, and possessed of good keeping qualities. It should, however, be preserved from air in bottles, well filled and securely stoppered: Take of strychnia, 24 grs.; sulphate of quinia, 860 grs.; sulphate of iron, 4 ounces, 40 grs.; phosphate of sodium, 12 ounces; pure crushed sugar, 60 ounces (all avoirdupois weight); dilute phosphoric acid, 48 ounces (fluid, ? Rep.). Dissolve the sulphate of quinia in distilled water, with sufficient diluted sulphuric acid, precipitate with ammonia-water, collect the precipitate on a filter most carefully, avoiding too much water, and add to the dilute phosphoric acid in which the strychnia has been previously dissolved. Dissolve the sulphate of iron in 2 pints and the phosphate of sodium in 5 pints of recently boiled distilled water, filter the iron solution if necessary to remove any oxidation, allow the solution to cool to 130° F., and then add very gradually, with constant stirring, the solution of phosphate of soda to that of the sulphate of iron; allow the precipitate to subside, remove the supernatant liquid, and wash the ferrous phosphate by decantation with recently boiled distilled water; then transfer to a calico filter, express quickly the remaining liquid and dissolve in the dilute phosphoric acid; finally, add the sugar, dissolve without heat, and subsequently add sufficient distilled water to make the product measure 96 fluid ounces, each fluid drachm of which will contain 1 grain of phosphate of iron, 1 grain of phosphate of quinia, and $\frac{1}{32}$ gr. of strychnia. Ph. J. Trans., Dec. 22d, 1877, p. 482.

Syrup of Pyrophosphate of Iron and Sodium.—Dissolve 25 grams of pyrophosphate of sodium in 250 grams of distilled water, and 5 grams of dry ferric sulphate in 100 grams of water; add this last solution to the former, and in the clear colorless liquid dissolve 620 grams of sugar.

By omitting the sugar and adding enough distilled water to make 1 liter, the *solution of pyrophosphate of iron and sodium* adopted by the Pharm. Society is produced.

Syrup of Hypophosphite of Sodium.—The formula of the Paris Pharmaceutical Society is as follows: Dissolve 5 grams of the salt in 445 grams of simple syrup, and add 50 grams of orange-flower syrup. A tablespoonful weighing 20 grams contains 0.20 gram (3 grains) of hypophosphite of sodium. A. J. Ph., Sept. 1877, p. 443.

Syrupus Giberti.—Hans M. Wilder communicates the following formula for its preparation: 2 grains red iodide of mercury, 100 grs. iodide of potassium, 2 fluid drachms of water and syrup to make 6 fluid ounces. A. J. Ph., Sept. 1877, p. 440.

SAPONES.

Medicinal Soap.—G. H. Barkhausen finds that olive oil is completely saponified, if 100 parts are treated with an alcoholic solution of 16.5 p. of potassa or 11 p. of soda, at 100° C.; it is saponified also by 18.5 per cent. of potassa or 12 per cent. of soda in alcoholic solution at 100° C., and subsequent heating with water; but it requires not less than 25 per cent. of potassa or 16 per cent. of soda, if these are used in pure aqueous solution. In accordance with these observations he has suggested modified formulas for *spir. saponis* and *liquid opodeldoc* (see Liniments), and he also gives the following formula for a pure medicinal soap. 100 p. of olive oil, 150 p. of solution of soda in alcohol, containing 12 per cent. soda, are dissolved at 100° C. (= 212° F.), and the mixture is evaporated to dryness in a steam-bath, after having added 200-300 p. of water. The product contains, of course, all the glycerin, which the author considers an advantage, since it has a tendency to prevent the soap from becoming rancid. Schweiz. Wochenschr. f. Ph., April 26th, 1878, p. 147.

Sapo Viridis—Preparation.—Herman Betz draws attention to the fact that this soap, as found in commerce, is often very impure, being prepared from common animal fats and colored with various substances. The scarcity and high price of hempseed oil is one of the reasons why the soap is so often adulterated, and the author therefore, in consideration of the fact that linseed oil has the same properties in making a soap for the purpose for which the green soap is used, proposes a formula for its preparation, in which linseed oil and the green coloring matter precipitated from a solution of indigo by lime, are used in lieu of the hempseed oil: One pint each of linseed oil and of solution of potassa are boiled together in a porcelain dish, with a well-regulated heat, until the mass becomes stringy; sufficient of the above-named coloring matter is then added, followed by 10 drops of oil of citronella. If saponification is perfect, the mass is homogeneous and transparent; opaqueness may be due to a want of water, or to an excess of fat. A. J. Ph., Feb. 1878, p. 65.

Referring to the above formula of Mr. Betz, E. B. Shuttleworth draws attention to the fact that if the solution of potassa of the U. S. P. is intended, as is presumable, the quantity directed is only about one-third of that actually required for saponification. In correcting this error, he gives the following practical directions regarding the process: In a clean pot or dish, preferably of iron or copper, and capable of containing at least three times the quantity, put one part, by weight, of linseed oil; heat gently and add in two portions, three parts in all, by measure, of liquor potassa, U. S. P. or B. P., provided either come up to the standard requiring 5.8 and 5.84 per cent. of hydrate of potassa; boil quietly and stir frequently until the mass becomes clear, which, with 4 ounces of oil and 12 fluid ounces of liquor, will require about one hour (and with 10 pounds of oil about five hours). If, during the process, the mass becomes too thick to stir easily, add a little water. Allow the soap to become cool, but before it sets, work in the coloring matter, which must be previously prepared by boiling 20 grains of finely powdered indigo with one and a half ounces of water until a thin paste (about one drachm) is formed. Can. Ph. J., June, 1878, p. 345.

Castor Oil Soaps.—Giffard mentions various purposes for which the soaps, obtained by saponifying castor oil with an alkali, or by double decomposition between an alkaline ricinoleate and a metallic salt, may be used with advantage. *Ricinoleate of sodium or potassium* would form a good excipient for aperient pills. *Ricinoleate of magnesium*, obtained by decomposing an alkaline ricinoleate with sulphate of magnesium, is a mild, agreeable laxative. *Ricinoleate of iron* suggests itself as likely to be free from the usual constipating effects of other iron salts. *Ricinoleate of mercury*, a white precipitate of rather firm consistence, may prove serviceable for endermic applications. New Rem., April, 1878, p. 116; from Rép. de Phar., 1878, No. 2.

Russian Soaps.—Grabowsky has communicated some experiments made with soaps made in Russia, to the Russian Physical Society, and obtained the following results:

(1.) Soap prepared from oleic acid contains less water than soaps manufactured from solid fats (stearic acid).

(2.) With the decrease of the melting-point of the acids used in soap manufacture the dissolving power increases.

(3.) In soaps prepared from solid fat acids more than one-third by weight is lost, without any use, when the soap is used for washing purposes.

The author therefore proposes that the solid fat acids should be used for the manufacture of candles, and the oleic acid for the preparation of soap; the resulting soap is easily soluble in water. Ch. News, July 27th, 1877, p. 39.

Alkaloidal Soaps.—These compounds, which are almost insoluble in water, are, by the formulas adopted by the Pharm. Society of Paris, generally prepared by double decomposition. An aqueous solution of medicinal soap, as neutral as possible, is mixed with a concentrated and neutral solution of the chlorhydrate of the alkaloid, until the latter solution ceases to be precipitated or clouded by further addition of the soap solution. The precipitate is collected, washed, and dried by gentle heat. This mode of preparation is preferable to a direct union of the alkaloid and fatty acids, because the latter yields a less definite product.

Metallic Soaps (oleomargarates of metals) are also obtained by double decomposition, the process being precisely like the above, with the exception that the precipitate is collected and strongly expressed. Soluble metallic sulphates may be used to prepare a great number of these compounds (those of iron, copper, zinc, etc.). Mercury soap is obtained from the mercuric nitrate in acidified solution, or from the mercuric acetate. New Rem., Sept. 1877, p. 285.

Iodine and Bromine Soap.—Dr. Hager has analyzed two examples of commercial soaps from Aix-la-Chapelle, which are recommended medicinally for the preparation of artificial Aix-la-Chapelle baths. Based upon his analyses, Dr. Hager recommends the following methods for preparing these soaps:

Boil together 300.0 oil of poppy, and 100.0 each, of water, solution of potassa and solution of soda, in a porcelain vessel, until saponification is completed, and mix with the resulting soap 10.0

iodide of potassium, 5.0 bromide of potassium, 30.0 hyposulphite of sodium, 10.0 sulphide of potassium, and 2.5 precipitated sulphur. The well-mixed soap is to be divided into two glass vessels, each portion being sufficient for one full bath.

The second formula differs from the above in that 36.0 sulphide of calcium, 15.0 iodide of potassium, and 7.5 bromide of potassium are added to the poppy oil soap, and in that the resulting compound is divided into three portions for as many baths. Ph. Centralh., Oct. 25th, 1877, p. 357.

TINCTURÆ.

Tinctures.—Hans M. Wilder suggests that the honey in tinctures—cardam. comp. and opii camph.—might very well be substituted by simple syrup. The disagreeable tightening of tincture stoppers may be prevented by rubbing the stoppers with a little paraffine and giving them a turn in the neck of the bottle, so as to distribute a thin coating of paraffine all over. This coating should be renewed two or three times a year. Paraffine may practically be considered insoluble in the different menstrua of the tinctures. A. J. Ph., Sept. 1877, p. 440.

Theodore G. Davis makes some general remarks on tinctures. He suggests that the coming Pharmacopœia should adopt for *alcohol dilutum* one containing 50, for *alcohol* one containing 70 per cent. of absolute alcohol, and *alcohol fortior* as at present. The dilute alcohol of the present Pharmacopœia is too weak for many of the tinctures now made with it. The tinctures, also, should be more concentrated, and should represent at least one part of the drug in four parts of the finished preparation. A. J. Ph., March, 1878, p. 107.

Tincture of Cantharides—Proposed Change in the Menstruum.—G. W. Kennedy's experiments lead him to suggest alcohol as the menstruum for tincture of cantharides, as preferable to diluted alcohol, for the following reasons:

1. Diluted alcohol does not dissolve the cantharides as well as alcohol; the dregs remaining from several quantities of tincture yielded to alcohol an extract, which possessed decided vesicating properties.

2. The tincture, as at present prepared, soon forms a precipitate, and is, therefore, inelegant in appearance; the tincture made with alcohol is beautiful, clear, and greenish yellow.

3. Tincture of cantharides is one of the ingredients of the many hair tonics which pharmaceutists are often called upon to make, and, on account of the solubility of castor oil, which also frequently enters into the composition of these preparations, it is likewise preferable to have the tincture made with strong alcohol. A. J. Ph., Feb. 1878, p. 64.

Tr. Opii.—The strength of tincture of opium as ordinarily sold has been the subject of investigation by three students of the Philadelphia College of Pharmacy, Class 1876–77. Jos. Staple Smith merely determined the amount of extract left on the evaporation of one fluid ounce of the tincture, five samples giving the following results: 21.5, 15, 11.5, 9.5, and 8 grains. Each fluid ounce represents 37.5 grains of dry opium, which, on an average, yields 60 per cent. or 22.5 grains of extract; the presumption therefore is, that of the five samples examined, only one was made in accordance with the Pharmacopœia.

W. H. Llewellyn ascertained not only the amount of extract, but separated also the morphia from one fluid ounce of commercial laudanum, using for the latter operation a modification of Staples's process; his results were as follows:

Extract from 1 fluid ounce.

15., 15., 15.50, 23.25, 28.75, 30., 32., 37., 39.50 grains.

Morphia from 1 fluid ounce.

4., 3.75, 3., 3.25, 2., 1.15, 1., 1., 0.5, trace.

Opium of officinal strength should yield 3.75 grains of morphia per fluid ounce.

Another series of experiments with laudanum, sold at retail, was made by Burt P. Gates, who determined the specific gravity at 60° F. by means of a 1000-grain bottle, and made two morphiometric assays, following Staples's process with some modifications; his results are as follows:

Specific gravity.

.965, .952, .962, ,956, .958, .955, .953, .949, .956, .943, .947, .956, .939, .950, .881

Morphia per fluid ounce.

3.85, 3.70, 3.54, 3.39, 2.96, 2.62, 2.77, 2.46, 2.16, 2.08, 2.00, 1.85, 1.63, 1.39, 0.77

Percentage.

10.3, 9.9, 9.4, 9.0, 7.8, 7.0, 7.4, 6.6, 5.7, 5.6, 5.3, 4.9, 4.4, 3.7, 2.1

The results of these authors show a lamentable variability in the commercial character of this important preparation. Prof. Maisch, who communicates these results, observes that some apothecaries have adopted the dangerous practice of keeping on hand two kinds of tincture of opium, one made according to the Pharmacopœia formula, and another weaker tincture for ordinary sales. A. J. Ph., Oct. 1877, p. 511.

J. B. Moore draws attention to a quick process for preparing tincture of opium, which, however, will admit of some criticism. It consists in digesting the opium first in hot water at 160°, and then the expressed residue in stronger alcohol at 150° for the same period. The two liquids are then mixed, and the expressed matter is percolated with the mixtures and sufficient diluted alcohol to make the proper volume of tincture. In a similar manner he recommends that *camphorated* tincture of opium may be prepared. Drug. Circ., Oct. 1877, p. 165.

Tincture of Guaiac.—Thos. D. Williams proposes the following modification of the officinal process: Six troy ounces of guaiac resin, in powder No. 40, are mixed with one and a half pints of alcohol in a half gallon bottle, and set aside in a warm place for 24 hours. The liquid is then poured off, the undissolved portion packed into a funnel, the alcoholic liquid first poured upon it, and the percolation finished with alcohol until two pints are obtained.

Ammoniated Tincture of Guaiac may be conveniently made in the same manner. The amount of insoluble residue depends on the purity of the guaiac resin. A. J. Ph., Nov. 1877, p 551.

Ammoniacal Tincture of Lupulin.—In view of the fact that neither water nor alcohol completely extract the active principles of lupulin, a writer in "Boletin del Colegio de Farmaceuticos de Barcelona" (No. 5, 1878), proposes to employ aromatic spirit of ammonia as a menstruum. 56 grams of lupulin are macerated for seven days in 473 grams of the aromatic spirit; the mixture is filtered, and the dregs are washed with sufficient menstruum to make 473 grams of tincture. New Rem., June, 1878, p. 176.

Tincture (*or Mixture or Solutio*) *Aloes Composita.*—The following formula, taken from "Proc. King's Co. Med. Soc.," is given in "New Rem." (April, 1878, p. 125): Aloes socotrinæ, ℥j; sodii bicarbonatis, ℥iss.; glycerinæ, tinct. lavend. co., āā f℥ij; ol. menthæ piper., ♏xxv; aquæ, Oj.

Tinct. Physostigmatis Ætherea.—Hager communicates the following formula for a tincture of calabar bean, which contains mainly physostigmin and only traces of calabarin: 10 p. extract of calabar bean are mixed with 2 p. carbonate of magnesium, the powder is macerated 2 days with 60 p. pure ether, and the ethereal tincture, amounting to about 50 p., is diluted to 100 p. with diluted alcohol. The product should be kept in a dark place. It contains mainly *physostigmia* and only traces of *calabaria.* Ph. Centr. H., July 12th, 1877, p. 226.

Tinctura Dermophyllæ Radicis (*Tayuya*).—Luigi Ubicini prepares a concentrated tincture of Tayuya (see Proceedings, 1876, p. 183), by macerating 1 p. dried root with 3 p. 80 per cent. alcohol. This concentrated product is recommended for external and hypodermic use; for internal use it is diluted with 3 volumes of diluted alcohol, and the dose of this diluted preparation is 2 drops, gradually increased to 12 drops 3–4 times a day. The dilute tincture, mixed with 20–30 volumes of water, is applied to scrofulous sores, skin diseases, etc., while the concentrated tincture is applied to hardened glands. For hypodermic use the concentrated tincture, in doses of 0.3–0.4–0.5, is diluted with water to 1.0. Ph. Centr. H., July 12th, 1877, p. 212.

Tinctura Caladii Sequini, Scholz.—This tincture is recommended by Scholz as a remedy in pruritus, prepared from the fresh leaves and flowers of caladium sequinum (which see), by bruising 10 parts of the substance with the greatest care, macerating with 12 parts of 90 per cent. alcohol, and expressing. The maximum single dose is 0.6 grams or 15 drops, and the highest daily dose about 1.5 grams, or about 40 drops. New Rem., April, 1878, p. 11.

Aromatic Tincture of Angustura.—E. J. Davidson proposes a tincture made by percolating angustura bark ℥ij, cascarilla ʒiv, bitter orange-peel ℥iv, cinnamon ʒiv, cloves, cardamom, nutmeg, coriander, of each ʒij, and anise ʒv, with a mixture of f℥ij of glycerin and one pint of diluted alcohol, and following this by sufficient diluted alcohol to make two pints of percolate. The tincture is a fair imitation of the so-called "Angustura bitters," and is found by the author to assist in disguising the bitter taste of nux vomica, for which reason he proposes an elixir of nux vomica, the formula for which will be found under Elixirs in this report. A. J. Ph., Jan. 1878, p. 22.

VAPORS.

Vapor Pini Sylvestris.—The Pharmacopœia of the Throat Hospital of London gives the following formula: Oil of Scotch pine (fir-wood oil), 40 min.; carbonate of magnesium (light), 20 grs.; water, q.s. ad 1 ounce. Mix. A teaspoonful in a pint of water at 140° F. for each inhalation.

Vapor Pini Pumilionis, of the same standard, is prepared by substituting in the above formula ½ drachm oil of mountain pine for the oil of Scotch pine, and using only 15 grs. of carbonate of magnesium. It is used in the same manner, but is rather more powerful than fir-wood oil. New Rem., Jan. 1878, p. 9.

MISCELLANEOUS FORMULAS.

Meat Juice.—The so-called "Valentine's Meat Juice," has been subjected to analysis by J. Forster, who found it to be a dark-brown, homogeneous liquid, reacting faintly acid, and having but a slight deposit (0.13 per cent.), consisting mainly of phosphate of magnesium. It possessed a pleasant odor and taste, and was composed of 59.16 water and 40.84 solid substance. The latter is composed of 13.88 ash and 26.96 combustible substance, in which 0.73 albumen, 3.45 nitrogen, and 20.50 substance insoluble in alcohol, were determined. These results lead the author to the conclusion that it differs from Liebig's extract of meat, mainly in that it contains more water and *a trace of albumen;* the large quantity of albumen, which the manufacturer of the preparation claims to be one of the advantages of his product over that made by Liebig's method, was not found; the absence of all fat—which the manufacturer claims to be another advantage—is really no advantage, since small and moderate quantities of fat are not only readily accepted by the weakest stomach, but the total absence of fat in nutrients is a disadvantage. An interesting result of the author's analysis is the small amount of solid (dry) substance contained in each vial, which, if the manufacturer's statement can be relied on, is the product of 4 pounds of lean meat, free from fat. Ph. Cent. H., August 23d, 1877, p. 275.

Beef Tea.—Dr. Horace Hare has determined that beef boiled in the good old-fashioned way, in a bottle with water, gives a resulting solution which contains only about one-fourth of one per cent. of nourishing material. The beef tea thus made is chiefly a solution of the salts of meat, and is, therefore, not nutritive, and only valuable as a stimulant to digestion. But there is another way to make beef tea which gives better results. Take a quantity of tender meat, and, after cutting off the fat, chop it up fine, put in a bowl, pour a pint (?) of water over it, and let it stand over night. It may possibly be well to keep the water just on a simmer; do not raise the temperature above 140°, however, or you will coagulate the albumen, and so either leave it on the sieve in straining, or introduce it into the stomach in the form of curds. After this simmering solution has been allowed to stand over night, pour it into a pipkin and heat it again gently with enough salt to give it flavor, and, if necessary, add a drop or two of muriatic acid. Then pour it out over a hair sieve into a jar. The resulting solution will contain all the nutriment possible, and is the most valuable kind of stimulant. New Rem., March, 1878, p. 92.

Anti-asthmatic Cigarettes.—The following formula is given in "New Rem." (April, 1878, p. 125): Belladonna leaves, stramonium leaves, digitalis leaves, sage leaves, of each 5 grams, are extracted with hot water, 1000 grams; and to the filtrate are added, potassium nitrate, 75 grams; tinct. benzoin, 40 grams. Into this liquid thin sheets of blotting-paper are immersed one after another, where they are left for twenty-four hours, after which they are dried and cut up into sheets of 10 x 9 cm., which are made into cigarettes.

Transparent Glycerin Jelly.—Take 1 ounce transparent soap, dissolve in 4 ounces of water and 4 ounces glycerin, by the aid of heat. While still warm add 20 ounces glycerin, and when nearly cold add perfume and pour into glass jars. This will make a transparent jelly of a pale amber color. New Rem., March, 1878, p. 77.

Hair Restorative.—Prof. Erasmus Wilson recommends the following formula: Liquor ammonia, ol. amygdal. dulc., chloroform, āā f℥j; spiritus rosmarini, f℥v; ol. limonis, gtt. x. The scalp is to be well cleansed with a stiff brush before applying the lotion, which should be diluted if it should be found too strong. New Rem., April, 1878, p. 125.

Brilliant Signal Light.—If equal parts of magnesium dust and finely-powdered chlorate of potassium are mixed, a compound is produced which, when brought in contact with a red-hot body, will burn with *lightning rapidity*, producing an intense white light. This is very suitable for signal purposes. Ph. Cent. H., Nov. 29th, 1877, p. 407.

Carbon Points for the Electric Light.—F. Carré has made attempts to impregnate the carbon terminals with various salts, with the following results:

1. Potash and soda double the strength of the electric arc, and render it silent; they combine with the silica contained in the carbon, and the silica is deposited in the form of vitreous globules at 6 or 7 mm. from the points. These substances increase the light in the ratio 1.25:1.

2. Lime, magnesia, and strontia increase the light in the ratio 1.3–1.5:1, with production of various colors.

3. Iron and antimony cause an augmentation of light in the ratio 1.6–1.7:1.

4. Boric acid increases the hardness of the carbon points, but does not increase the light.

The manufacture of carbon points by impregnating pure and homogeneous charcoal with solutions of the above substances is convenient and economical, but it is better to mix the substances with the charcoal in powder. In the latter case the carbon is purified by washing, etc.; it is then mixed with the salt, moistened with a little gum solution, and is pressed through a wire-drawing machine by means of a powerful hydraulic press. The carbon terminals thus made are very superior to those obtained from gas carbon; they are very tenacious and rigid, and being perfectly homogeneous, the light obtained by their means is much less liable to variation; further, they do not explode when ignited, as there is no inclosed gas. J. Chem. Soc., Sept. 1877; from Compt. Rend., vol. lxxxiv.

New Copying Ink.—W. Gintle has recently subjected a copying ink, which occurs in commerce under the name of "Paris Copying Ink," to analytical examination, and, on the basis of his results, recommends the following method of producing an ink, which possesses all the characters and advantages of the article analyzed: A solution of extract of logwood of 10° B. is treated with 1 per cent. of alum, and then with sufficient lime-water to produce a permanent precipitate. The mass is then treated with a few drops of solution of chlorinated lime, sufficient to produce a distinct blue-black coloration of the magma, and then with sufficient diluted hydrochloric acid until a distinct red solution is formed. A small quantity of gum and 0.5 per cent. glycerin is then added. It is necessary that decided excess of acid be avoided in preparing this ink, since it is evident that by the presence of a trace of alkali in the copying paper the acid is neutralized and the blue-black lake is thus reproduced. Evidently, also, the small percentage of chloride of calcium, formed during the process, increases the copying properties of the ink. An excess of chlorinated lime must also be avoided. Ph. Centralh., Aug. 23d, 1877, p. 277.

Ink that cannot be Erased.—An ink that cannot be erased, even with acids, is obtained by the following receipt: To good gall ink add a strong solution of fine soluble Prussian blue in distilled water. This addition makes the ink, which was previously proof against alkalies, equally proof against acids, and forms a writing fluid which cannot be erased without destruction of the paper. The ink writes greenish-blue, but afterwards turns black. A. J. Ph., March, 1878, p. 136.

Carmine Ink for Draughtsmen.—The "Polytech. Notizblatt," recommends the following formula: Triturate 1 gram of pure carmine with 15 grams of solution of acetate of ammonia, and an equal quantity of distilled water in a porcelain mortar, and allow the whole to stand for some time. In this way a portion of the alumina, which is combined with the carmine dye, is taken up by the acetic acid of the ammonia salt, and separates as a precipitate, while the pure pigment of the cochineal remains dissolved in the half-saturated ammonia. It is now filtered, and a few drops of pure white sugar syrup are added to thicken it. A solution of gum arabic cannot be used to thicken it, since the ink still contains some acetic acid, which would coagulate the bassorin, one of the constituents of the gum. N. Rem., Dec. 1877, p. 371.

Violet Logwood Ink.—A. Du Bell prepares a violet ink from logwood by dissolving 10 grams of extract of logwood in 500 grams of distilled water, and adding solution of stannous chloride until the desired tint is obtained. The ink is then filtered. No gum arabic is required to thicken this ink, the extractive matter being sufficient to give it consistence.

Red Logwood.—Ink is obtained by adding 20 grams of Roman alum to the solution of extract of logwood, obtained as above, instead of the stannous chloride. The ink is filtered and must be well protected from air. Ph. Centralh., Nov. 9th, 1878, p. 79.

Stains for Wood.—The following methods of staining wood, such as oak, pine, beech, poplar, etc., are recommended by Leo, and have been found very satisfactory:

1. *Yellow.*—The wood is coated with a hot concentrated solution of picric acid, dried and polished.

2. *Ebony-black.*—The wood is coated several times with a concentrated solution of extract of logwood, then with solution of acetate of iron of 14° Baumé, until a deep black color is produced.

3. *Gray.*—One part of nitrate of silver dissolved in 50 parts of distilled water. The wood is coated twice with this solution, then with hydrochloric acid, and finally with ammonia-water, and dried in a dark place. It is then oiled and polished. Lighter shades of gray are produced by more dilute solutions.

4. *Light Walnut.*—One part of permanganate of potassium is dissolved in 30 parts of water. The wood is coated twice with the solution, and washed off with water after 5 minutes. It is then dried, oiled, and polished.

5. *Dark Walnut (Veined).*—After the treatment as for light walnut, the dark veins are produced by means of solution of acetate of iron.

6. *Dark Mahogany.*—15 grams of cut alkanet root, 30 grams of powdered aloes, and 30 grams of powdered dragon's blood, are digested with 500 grams alcohol of 95°, for 3 or 4 days, in a warm place, in a glass vessel, tied over with bladder, the mixture being frequently shaken and finally filtered. The wood is first stained with nitric acid. It is then coated several times with the tincture prepared as above, dried, oiled, and polished.

7. *Light Mahogany.*—This is produced by a single coat of the above tincture. The grain of the genuine wood may be imitated by an expert, by means of solution of acetate of iron. Ph. Centr. H., Nov. 29th, 1877, p. 403, from Bottger's Polyt. Notizbl.

Rat Poisons.—Dr. Hager, referring to a rat poison which is being sold with the recommendation that it is not poisonous *except to rodents*, draws attention to the fallacy of such recommendation, since a substance that acts as a poison on rodents, must of necessity be poisonous (with rare exceptions ? Rep.) to all warm-blooded animals. The particular "rat poison" referred to by Dr. Hager proved to contain squills root, which, while not classified among the direct poisons, may nevertheless exercise poisonous action, and the appellation "non-poisonous" is, therefore, not justified. The author enumerates, among the substances that are not direct poisons, but are used in the preparations of comparatively harmless rat poisons, carbonate of barium, sulphate of lead, squill, ricinus seed, and calabar beans, and suggests the preparation of a good rat poison, according to the following formula:

Ricinus seed, 100 p.; calabar bean, 20 p.; beat to a paste, and add of powdered squill and flour, each, 50 p., and sufficient fresh lard (about 60 p.) to make a suitable mass. Ph. Centr. H., Sept. 6th, 1877, p. 289.

Phosphorus Paste.—H. W. B. finds the formula published by R. Rother, in 1872 (Pharmacist, vol. v.), to be an excellent one, but finds that the manipulation can be improved. The formula is as follows: Starch, 4 ozs.; flour, 12 ozs.; glycerin, 12 ozs.; phosphorus, 1 oz.; water, a sufficient quantity. Pour ½ pint of water on the starch, placed in a convenient vessel, stir the mixture, pass it through a No. 60 sieve into a cast-iron enamelled kettle, having the capacity of a gallon or more; add 12 ounces of water, then the flour, and mix thoroughly, and apply heat by means of a sand-bath, until the plasma begins to form, stirring in the meanwhile constantly with a suitable pestle; then take the vessel from the fire and stir as before, while the plasma forms, so as to evenly divide it; after a few minutes reapply heat, stirring briskly, until the plasma has completely formed, and then set aside to cool, stirring it occasionally. Now place 1 ounce of phosphorus, in stick, into a glass-stoppered wide-mouthed bottle, containing 12 ounces of glycerin, by weight, place the bottle in a water-bath, apply heat and shake frequently until the phosphorus is thoroughly mixed; then add it to a portion of the plasma, mix with 4 ounces of water, in portions of about one-fourth at a time, stirring the phosphorated glycerin into the mixture as rapidly as possible and keeping the mouth and nose protected from the fumes that arise. The result is a fine, smooth paste, which should be immediately bottled in small wide-mouthed bottles. The Pharm., Dec. 1877, p. 356.

Celluloid.—Paper is treated by a continuous process with 5 parts of sulphuric acid and 2 parts of nitric acid, which converts it into a sort of gun-cotton. The excess of acid is removed by pressure, followed up by washing with abundance of water. The paste when thus washed, drained, and partially dried, is ground in a mill, mixed with camphor, ground again, strongly pressed, dried, cut, bruised, laminated, and compressed again in a special apparatus suitably heated. It is said to be hard, tough, transparent, elastic, fusible, becoming plastic and malleable at 125° C. (= 257° F.). It ignites with difficulty, is decomposed suddenly at 140° C. (= 284° F.) without inflammation, and gives rise to reddish fumes. It is inodorous, and does not become electric in friction. Chem. News., Aug. 3d, 1877, p. 54.

Eburine is a composition formed from the dust of ivory or bone cemented together with gum tragacanth or albumen, and colored at pleasure. In some cases pressure and heat render the addition of any glutinous matter unnecessary. Ibid.

Imitation Ivory.—This compound is of recent invention, and is prepared by intimately mixing calcined magnesia with caoutchouc, by the aid of heat. The mass having been subjected to strong pressure, it assumes the density of ivory, and is said to be so firm and elastic that billiard balls made from it do not break, even when dropped from a height of 60 feet. New Rem., April, 1878, p. 125.

Paper-Lint.—An article of paper-lint, in sheets about twelve by eighteen inches, and about as thick as ordinary lint, has been lately introduced for surgical and other purposes, and appears to answer the purpose well. Moreover it is vastly cheaper than ordinary lint. Dr. W. W. Keen communicates his experience with the new article. New Rem., April, 1878, p. 110.

Crystal Cement for Porcelain.—R. Böttger has examined a cement, found in the German markets under that name, which he finds to be a simple solution of glue in acetic acid. It is readily made by pouring acetic acid (of about 20 per cent.) over pieces of clear glue, sufficient to cover, and heating until a homogeneous clear thick-flowing mass is formed. It is used by heating the edges of broken articles and applying the previously melted cement by means of a brush; the surfaces of the fracture being pressed firmly together and the mended object allowed to remain undisturbed for 12–24 hours. Zeitschr. Œst. Ap. Ver., July 10th, 1877, p. 330.

Shoe-grease.—The following compound is recommended for rendering shoes water-proof: Boiled linseed oil, 1 liter; mutton tallow, 125 grams; wax, 46 grams; resin, 32 grams. Zeitschr. Œst. Ap. Ver., Dec. 10th, 1877, p. 577, for J. de Ph. et de Chim. 1877.

MATERIA MEDICA.

a. Vegetable Drugs.

GENERAL SUBJECTS.

Indian Drugs.—Prof. W. Dymock continues his "Notes on Indian Drugs," which, as they appeared last year, were fully extracted for the report of 1876–77. The present "Notes" embrace the following drugs:

Polypodium Quercifolium.—A parasitic fern, found upon roots of trees and widely distributed. The part used medicinally is the rhizome, to which are attached the bases of the fronds and numerous thick radicles, all of a black color. The drug is recommended as a valuable alterative in malarious fever. It is locally called *Kadic pan*, and *Kadic pandan.*

Prangos Papularia.—The seeds (or fruits ?) are used by the Hakeems as a stimulant, carminative, and to promote the expulsion of the fœtus. The local name is *Faturasalium*, an Arabic corruption of Petroselinum. The taste is at first like anise, then bitter.

Aconitum Sp.?—Under the local name, *Wakma* and *Bikma*, the tuberous roots of an aconite, believed by Dr. Sakharam Arjun to be *A. palmatum*, are used medicinally in some parts of India. The tubers resemble those of A. napellus in shape and size. The drug is said to stop vomiting and purging, and to allay pain in the abdomen. The dose is two grains.

Naregamia Alata.—This is the Country Ipecacuanha or Trifolio of the Portuguese of Goa, and is locally called *Timpana* and *Kapur Bhendi.* The drug consists of the creeping root with the small stems deprived of the leaves attached. It is emetic in doses of 12 to 18 grains.

Methonia Superba.—The tuberous roots of this beautiful climbing plant are used as an alterative tonic. Although considered poisonous, Mr. Mooden Sheriff has given it in 12-grain doses without its producing any disagreeable symptoms. The local names are *Vindai* and *Nagkaria.*

Tribulus Terrestris.—Apparently the ripe fruit of this plant is the part used medicinally. The seeds are oily, and inclosed in very hard stony cells. The drug is locally called *Chota gokhroo*, has a rather agreeable taste, and is valued as a diuretic.

Polypodium Vulgare.—The dried rhizome is used under the local name of *Basfaii*, as aperient and deobstruent by the Mohammedan Hakeems.

Melia Superba.—The dried fruit of this tree is sold in all the shops under the name of *Kala khajur*, or *Kurroo khajur*, which means black or bitter date. The drug has a bitter, nauseous taste, and is a favorite remedy among the laboring classes for colic; half a fruit being an adult dose.

Peristrophe Bicalyculata.—The whole herb, gathered when in flower, and dried, constitutes the drug, locally called *Ghati pitpapra.* It has a faintly bitter, disagreeable taste, and is used as a substitute for *Fumaria Parviflora*, the true Pitpapra. (Ph. J. Trans., July 14th, 1877, pp. 23–26.)

Ocium Pilosum.—The small, black, oblong seeds, called *Tukmi Rihan*, are largely imported from the Persian Gulf, and are medicinally mucilaginous and slightly stimulant.

Dalbergia Sympathetica.—The leaves of this plant are used in Goa as an alterative. The local names are *Petguli* and *Titabli.*

Plantago Psyllium.—The minute, oblong, brown seeds of this plant, locally called *Bartung*, are largely imported from Persia, where they have great repute for dysentery, into India, through Bombay.

Phyllanthus Madraspatensis.—The seeds, locally called *Kanocha*, are small, polished, heart-shaped, and of gray color. They are very mucilaginous, and are (probably ? Rep.) used medicinally on account of this character.

Hibiscus, Sp. ?—The several roots branching from a knotted woody stock, are used by the Portuguese of Goa as an efficient substitute for Althæa, whence the local name, *Alti* or *Ultee*, a corruption of Althæa.

Bignonia Xylocarpa.—By a rough process of the same nature as that by which tar is obtained from pine wood, a thick fluid, of the color and consistence of Stockholm tar, is obtained from the wood of this tree. The local name is *Kursing.* A similar product is obtained from *Heterophragma Roxburghii Warus.* Both products have a reputation in certain cutaneous eruptions.

Paramignya Monophylla.—The long, woody root constitutes the drug locally called *Karwa wagutty.* It is considered alterative. It must not be confounded with "Wagutty" (Capparis brerispina.)

Centaurea Behen.—The dry root, of a whitish-brown color, much shrivelled and twisted, is imported into Bombay from the Persian Gulf in considerable quantities. It is locally called *Suffed behman*, and has a reputation as a blood purifier, and to increase the virile powers. The drug has been confounded with *Pshva-gandha*, the root of *Physalis somnifera*, by Ainslie.

Sphæranthus Mollis.—The drug is called *Moondi*, and generally consists of the whole plant, although the capitula are sometimes sold separately. It appears to be well known in India as an alterative and purifier of the blood.

Physalis Somnifera.—The local name of the drug is *Ashvagandsha*, and the root is (apparently, Rep.) the part used medicinally. The author has not been able to obtain reliable information regarding its physiological action.

Asgund.—The botanical source of this drug is uncertain. It consists of the root of the plant, which is thoroughly described by the author. Asgund has a mucilaginous and bitter taste, and it is used for its tonic and alterative properties.

Tiaridium Indicum.—The whole plant, locally called *Booroondi*, is used as a local application to boils, sores, and the stings of insects.

Ferula Alliacea.—The author communicates some further notes on "Hing," chiefly relating to his correspondence with the late Mr. Hanbury, and describes a sample of the unsophisticated drug received shortly after Mr. H.'s last letter on the subject. Further information is also given on

Kandaharee hing, the product of *Narthex assafœtida*, from Kandahar, and on

Hingra, the product of the same plant, from Persia and Affghanistan.

Balsamodendron Opobalsamum.—The berries, locally called *Hab ul balesan*, are imported from Arabia, and are kept by all the native druggists. They have a pleasant, terebinthinate odor, and are considered to be powerfully carminative and digestive, and are also praised as a stimulant expectorant.

Peganum Harmala.—The drug, called *Hurmaro* and *Hurmal*, consists of the seeds, mixed with a few pedicles, surmounted by the five-partite calyx and portions of the three-celled, three-furrowed capsule. The seeds are of a dull, grayish brown, irregularly angular, and about ⅛ inch long, and they have a heavy narcotic odor when crushed, and a bitter taste. Dr. Pandurang Gopal has experimented with the drug, and has found an infusion or tincture to act as a stimulant emmenagogue, and to produce slight intoxication like *Cannabis indica.* (Aug. 11th, 1877, p. 101–105.)

Sterculia Urens.—A gum, exuding most abundantly during hot weather, is obtained from this tree, and is used as a substitute for gum tragacanth. It is called *Karai*, *Pandrook*, and *Karalee*, and it varies much in appearance, some pieces resembling gum tragacanth, while others are lumpy or vermiform.

Pinilia Tuberifera.—Small, roundish bodies, sold under the name of *Zarwand i gird*, are found by Dr. Sakharam Argun to be the tubers of this plant. The drug is probably inert.

Hyoscyamus Niger.—The seeds are imported from Persia, and are locally called Khorasanee Ajwan. Henbane is cultivated in the Government gardens at Hewra, near Poonah.

Delphinium Sp.?—The flowers, flower-stalks, and a small proportion of the immature fruit, all of a light greenish-yellow color, and having a somewhat honey-like smell, constitute the drug locally called *Trayamana* and *Asfrak.* It is detergent, anodyne, and diuretic; also used in Bombay as a yellow dye for silk.

Poa Cynosurioides.—This grass is used by the Portuguese at Goa as a diuretic, and is called by them *gramina.* The chief use, however, appears to be in the funeral ceremonies of the Hindoos; the chief mourner wearing a ring of the grass on his finger. The Hindoos call it *kash*, *darbh*, or *dad.*

Aplotaxis Costus.—The Bombay name of the drug is *Ouplate*, in other parts of India it is *Koot* or *Putchak.* Large quantities of ouplate are imported into Bombay from Cashmere by way of Amritsir. (An interesting account of this drug will be found elsewhere. See "Costus.")

Tephrosia Purpurea.—This is a common weed in the rains. The whole plant, which is about two feet in height, is pulled when the flowers begin to appear, and tied in bundles for sale.

The local name of this drug is *Sarpankha*, and it is given in dyspepsia.

Lodicea Seychellarum.—The kernel of the sea cocoanut is in great repute among the Arabs and Indians as a strengthening medicine. It is locally called *Daryai* and *Naril.* The leaves of the palm are made into beautiful work-baskets, hats, bonnets, etc. (September 1st, 1877, p. 161–162.)

Abutilon Indicum.—The bark of this shrubby plant is used in Goa, where it is called *Tubocuty*, as a diuretic. It is feebly astringent and slightly bitter. In other parts of India it is called *Petaree.*

Althæa Officinalis.—The flowers, called *Gul khairo*, the root, called *Risha i khitmi*, and the seeds, called *Tukm i khitmi*, are imported into Bombay from Persia. The medicinal uses are obvious.

Malva Sylvestris.—The fruit, called *Khabazee*, is a common bazar drug, and is imported from Persia.

Viola, *Sp.?*—The blossoms of a species of blue violet, mixed with a few leaves and fragments of the plant, constitute a drug called *Gul i banafsha.*

The small knotted pieces of rhizome, of a variety of viola having white flowers, to some of which flowers and leaves are attached, constitute the drug called *Kishmiri banafsha.*

Clerodendron infortunatum.—The leaves of the plant are noticed in the Pharmacopœia of India, as a cheap and efficient tonic and antiperiodic. They are also said to be used as a vermifuge. The drug is locally named *Kari.*

Papaver Rhœas.—The local name (of the plant?) is *Lala.* It is cultivated in Guzerab as a garden flower, but the petals do not appear to have ever been an article of Indian Materia Medica. In the Bombay shops the capsules of a poppy, in size and shape just like those of *P. rhœas*, are sold under the name of *Jungli mudrika;* the word mudrika signifying "stamped with a seal."

Polyporus Officinalis.—The white agaric of European medicine is called *Gharikeen*, and is imported into Bombay from the Persian Gulf, and generally kept by native druggists, being an important article in the Materia Medica of the Mohammedans, who prescribe it in a great number of disorders.

Conium Maculatum?—Under the name of *Keerdamana*, a fruit is sold in the shops which resembles English hemlock fruit, with the exception that it is a little larger and of a darker gray color. The slight differences are probably due to climatic influences.

Cinnamomum Loureiri?—Under the name of *Kala nagkesur*, the fruit of a cinnamon is sold. The author is informed that it is that of *C. Loureiri.*

Under the name of *Darchini* the bark of the Chinese *Cassia lignea* is sold in Bombay. True cinnamon is not obtainable. The bark of various Indian cinnamons is sold under the name of *Taj.* It is much inferior to the Chinese article.

Corchorus Trilocularis.—The local name of the plant is *Karroo chuntz;* the seeds of the plant, which are small, black, and angular, are called *Raja jeera* in the bazars. A small proportion of the larger seeds of *C. olitorius* has invariably been found by the author in samples of the drug.

Sisymbrium Iris.—The small, red, oblong seeds, about 1·20 inch long, one surface convex, the other grooved, the groove ending in a notch, interior yellow and oily, constitute a drug called *Khakshir.* Medicinally it is thought to be stimulant and restorative. The drug is largely imported from Persia.

Cerbera Thevetia.—This plant is the *Thevetia neriifolia* of the "Pharmacopœia of India." The bark is recommended in that work as an antiperiodic, but does not seem to be used much in the neighborhood of Bombay, although an abundant supply can be easily had.

Justicia Gendarussa.—The medicinal properties of this plant, locally known as *Teo*, are noticed in the "Pharmacopœia of India," but it does not appear to find medical application.

Pistacia Khinjuk.—The galls of the plant are known by the name *Gul i pista.* They are bright pink, when fresh, on one side, and yellowish white on the other, and vary much is size and shape. When old they are reddish brown, as stated in the "Pharmacopœia of India." They are used as an astringent and for tanning. Nov. 17th, 1877, pp. 383 to 386.

Asclepias Curassavica.—The local name of the plant is *Kurki.* It is common in gardens. The woody branching root, when fresh, exudes a milky juice. The taste is bitter and somewhat acrid. The microscopic structure of the root is described.

Leea, Sp.?—A species of *Leea* furnishes the root locally called *Geeno*, and by the Portuguese of Goa, *Ratanhia*, to which it bears considerable resemblance. It is agreeably astringent, and is administered in diarrhœa and chronic dysentery.

Lauraceæ, Gen.? Sp.?—The leaves and bark of a tree, belonging to the Lauraceæ, constitute a drug called *Mirio.* The drug (bark?) abounds in mucilage and is given as a demulcent in bowel complaints.

Aconitum, Sp.?—The name *Induar* appears to have been applied at different times to various tuberous roots, supposed to have alexipharmic properties. In India it is applied to a species of aconite. The author describes the drug as found in the markets of Bombay. Wonderful power as a tonic and alexipharmic are attributed to it, and it generally brings a high price.

Coptis Teeta.—Under the name *Mamuran* two distinct varieties of drug are found in the Bombay market, both of which come from China, via Singapore. The kind most esteemed is a yellowish rhizome, as thick as a crowquill or larger, having a few spirous projections, and corresponds with the description of Coptis root, in the "Bengal Dispensatory;" while the second variety corresponds with the description of that drug in the "Pharmacographia," and with all the descriptions of *Thalictrum foliosorum.* (Jan. 6th, 1878, pp. 521, 522.)

Urticaceæ, Gen.? Sp.?—The root of an urticaceæ constitutes a drug named *Pokli.* It is sweetish and astringent to the taste, and has purgative action. The plant is found in Goa.

Berberis (several species).—The wood of several species of Berberis, called *Darhalad.* The extract, called *Rusot*, and the fruit, called *Lirishk*, constitute drugs of the Bombay market. Darhalad comes to Bombay from Northern India and from the Madras Presidency. *Rusot* and *Lirishk* from Northern India. The uses are not given.

Nelumbium Speciosum.—The flowers of the plant called *Kamal* are considered by both Hindoos and Mohammedans to be cooling and astringent. The seeds, which are imported from Persia in large quantities, are used as food. In times of scarcity, the roots, notwithstanding their bitterness, are also so used.

Anastatica Hierochuntina.—The dried plant, which appears to have first been introduced into India by the Mohammedans, is kept in all the druggists' shops, and is prescribed in difficult labor, being placed in water until it expands, and the water given to the patient. The drug, called *Kaf-i-maryam*, is imported from Syria, by way of the Persian Gulf.

Capparis Spinosa.—The root-bark constitutes the drug called kabar. It appears to have been introduced as a medicine to the Hindoos by the Mohammedans, and is valued as a detergent and astringent in palsy, dropsy, and gouty and rheumatic affections. It is imported via the Persian Gulf.

Portulaca Quadrifida.—The local name is *Kurpa.* The fresh leaves are acid, and are prescribed externally as a cooling application, and in the form of an infusion as a diuretic. It has long been a domestic remedy of the Hindoos.

Garcinia Indica.—The local name of the tree is *Kohum.* It is common on the western coast, between Damann and Goa, is often cultivated, and is valued for its fruit, which is largely used as an acid ingredient in curries, and by the apothecaries of Goa, for preparing a fine purple syrup. The seeds yield the fat known as *Kohum butter*, which is quite solid and finds varied application. (Jan. 19th, 1878, pp. 564, 566.)

Helieteres Isora, *Linn.*—The fruit, *Maroree*, *Marorphali* (Hind.), *Muradsingh kawun* (Bomb.), *Valumbirikai* (Tam.), is kept in most druggists' shops, and as a domestic remedy is, perhaps, one of the best-known articles in the Hindoo Materia Medica. It enters into most prescriptions for the cure of griping in the bowels and flatulence, especially in the case of children. Its chief virtue seems to be its harmlessness.

Pterospermum Suberifolium, *Willd.*—The white fragrant flowers of this tree, which appear in May, rubbed into a paste with kángika (rice vinegar), is an ancient and well known Hindoo remedy for hemicrania. The current name for the plant is *Muchukunda.*

Balsamodendron Opobalsamum, *Kunth.*—The balsamic product obtained by extracting the leaves and wood by boiling in water (Balsam of Mecca) is called *Balasan;* the wood, *Aood i balasan.* The author gives the history, description, and chemical composition, etc., of the balsam.

Melia Azadirachta, *Linn.*—The fresh root, bark, and fruit are the parts used. They are known by the names, *Bakayan* (Hind.); *Goree neem* (Bomb.); *Malai vémbu*, malai-véppam (Tam.). The bark is used internally and externally in leprosy and scrofula.

The fruit has poisonous properties, but is used for the same purpose. The leaves and flowers also appear to find medicinal application.

Poinciana Pulcherrima, Linn.—The bark, leaves, flowers, etc., are used. The local names are: *Gul i turah*, *Krishnachoora* (Hind., Beng.); *Gulriohr* (Bomb.); *Mail-kannal*, *Komri* (Tam.). The plant is one of the common garden shrubs in Bombay. All parts of the plant are said to be emmenagogue and purgative, but it does not appear to be used medicinally in Bombay. The plant was introduced from the Antilles, about 1792, but has become completely naturalized.

Cassia Sophora, Linn.—The leaves, seeds, and roots are used. It is supposed to have expectorant properties, is said to be a remedy for snake-bites, and, in the form of a poultice, the roots are said to remove ringworm. The local names are: *Sari kasondi*, *Kali-kasondi* (Hind. and Bomb.); *Ponna-virai*, *Péra-virai* (Tam.); *Kal-kasonda* (Beng.).

Cassia Occidentalis, Linn.—The leaves, seeds, and roots are known as: *Kasondi*, *Bari-kasondi* (Hind.); *Kikal* (Bomb.); *Nattan takarai* (Tam.). Its uses by the natives are the same as those of *C. sophora.* (March 23d, 1878, p. 745–747.)

Bauhinia Variegata, Linn.—The bark is called *Kachnár* (Hind.); *Kanchan* (Bomb. and Beng.). It is recommended in scrofulous complaints, and as an astringent, attenuant, and tonic.

Zizyphus, Sp.?—The dried fruit, locally called *Unnab*, it the jujube of Arabic and Persian works on Materia Medica. It is not produced in India, but is largely imported both from the Persian Gulf and China. The bark, leaves, and gum of the tree find various medicinal applications. The root also appears to be used, by the Vytians, in certain cases of fever.

Cardiospermum Halicacalum, Linn.—The root and leaves are used medicinally. The names by which they are known are: *Lalaphat kari*, *Nayaphatki* (Beng.); *Moota cottan* (Tam.); *Kanphootee* (Bomb.). The leaves are used in amenorrhœa; the root is described as emetic, laxative, stomachic, and rubefacient.

Sapindus Trifoliatus, Linn., called Ritha (Hind. and Bomb.); Pennan kottai (Tam.).—The soapnut has probably been in use among the Hindoos from the earliest ages as a detergent. Both Hindoos and Mohammedans use it medicinally. Its applications are various.

Semecarpus Anacardium, *Linn.*—The fruit, called *Bhela*, *Bhilawa* (Hind.), *Bila* (Bomb.), *Shén-kottai*, *Shérán kottai* (Tam.), is regarded by the Hindoos as acid, heating, stimulant, digestive, nervine, and escharotic.

Melilotus, *Sp.?*—The fruit of a melilotus constitutes a drug called *Ikleel-ul-malik*, and is esteemed by the Mohammedans for a great variety of disorders. Ph. J. Trans., June 15th, 1878, p. 1001–1003, and as above.

Maltese Drugs.—Robert Watson draws attention to the following drugs in use in Malta:

Ruta graveolens; local name, *Feigel;* used by the lower classes for abrasions and contusions. The leaves are powdered and mixed with olive oil and applied hot to the part affected.

Borago officinalis; local name, *Fidlokkum;* used in infusion and syrup for cough.

Hyoscyamus albus; local name, *Mamma teiga;* grows in great quantities in all uncultivated parts of the island. Used mixed with bread as a poultice in tumors of the breast.

Marrubium vulgare; local name, *Marrubia baida;* used in infusion in cases of cough.

Papaver somniferum; local name, *Xahxieh;* an infusion of the dried fruit is given to allay pain in young children. Many cases of death occur from its use.

Myrtus communis; local name, *Rehan;* the leaves, dried and powdered, are used as violet (? Rep.) powder in excoriation in young children.

Punica granatum; local name, *Rornmierr;* an infusion of the peel of the root is used as an anthelmintic.

Smilax aspera; local name, *Salsa paisana;* a decoction of the root is used by the lower classes as a remedy to cool the blood in skin diseases.

Sambucus niger; local name, *Sebuka;* the boiled leaves are used as an antidote for erysipelas.

Plantago major; local name, *Baibula;* this plant is to be found in cultivated parts during November. The lower superstitious class attribute imaginary virtues to it.

Verbena officinalis; local name, *Bukexrern;* the boiled plant is used in cutaneous eruptions in children.

Glechoma hederacea; local name, *Edera terrestri;* the infusion of the leaves is used as a preventive against pectoral and other complaints.

Scilla maritima; local name, *Ghausal;* the plant is very abundant on the island, the bulbs are exported. Ph. J. Trans., Nov. 3d, 1877, p. 341.

Medicinal Plants of Liberia.—E. M. Holmes has identified a number of plants which are medicinally applied in Liberia, and which may be sufficiently valuable to be used in other countries.

"*Fever Plant*" (*Ocymum viride, Willd.*).—This is an erect, somewhat shrubby plant, about three feet high, with ovate, lanceolate, acuminate leaves, from one to two inches long, which are crenate at the margin and abundantly dotted underneath with oil glands. It differs from a closely allied species, *O. gratissimum*, L., chiefly in its lesser size and in the teeth of the calyx being less united. When rubbed or chewed the plant gives off a strong odor like that of lemon thyme (*Thymus citriodorus*, Schreb.), and it appears probable that its virtues are due to thymol, the presence of which is suggested by the odor. According to Dr. Roberts, the nephew of the late President of Liberia, the plant is there a common remedy for fever of every kind, and he has entirely substituted it for quinia in his practice, since he finds it much cheaper and equally effectual. It is given in infusion, a wineglassful being administered at intervals until perspiration is freely induced, the patient being kept warm in bed. According to Lindley it is used in Sierra Leone for the same purpose.

"*Hæmorrhage Plant*" (*Aspilia latifolia, O. and H.*).—This is a herbaceous plant, belonging to the *Compositæ*, from one and a half to four feet high, with spreading branches and opposite very rough foliage. The leaves are ovate, acuminate, minutely serrate, and very hard to the touch, owing to the leaf being covered with very short, rigid hairs. The flowers are yellow, and about the size of those of the fleabane (*Pulicaria dysenterica*, Gaertn.). The flowerets of the ray are neuter, a feature which readily distinguishes this genus from those African genera to which it is most closely allied. From the other African species of the same genus, it is known by the pappus being almost obsolete, by the shape of the leaves, and by the scales of the involucre being equal in height to the flowerets of the disk. The account given by Dr. Roberts of the hæmostatic properties of the plant partakes of the marvellous. He states that it is always preferred by the natives to the treatment adopted by the Europeans, and that he has witnessed its use in several cuts where the arteries have been severed, the leaves and flowers being pounded together and applied to the wound, the hæmorrhage stopping in a few minutes, and the wound healing rapidly without any other application. The decoction, in doses of ℥ss. three times a day, is used in hæmorrhage from the lungs. Dr. Roberts is not sure, however, whether the dried plant would answer as well, as he has only seen the fresh plant used.

"*Small Senna*" (*Cassia Occidentalis, L.*).—The leaves of this plant are used in Liberia as a purgative, and are known under the above name, while those of a plant with large leaves, apparently a *Croton*, are known as "Large Senna." Dr. Livingstone brought to the Botanical Gardens at the Mauritius the seeds of this plant, which he stated that the natives in the interior of Africa roasted and used like coffee. It is now naturalized in the Mauritius, and is said to be used occasionally with good effect in certain cases of asthma, and also as a fomentation in some skin diseases. According to Macfayden, a decoction of the root possesses diuretic properties, and the leaves are used by the negroes, when smeared with a little candle-grease, as a substitute for adhesive plaster. According to Martius, the root is used in Brazil—where the plant is called *Gaja marioba*—in incipient dropsy, etc. *C. occidentalis* is also common in both the East and West Indies.

"*Pipybras*" (*Scoparia Dulcis, L.*).—This scrophulariaceous plant, which is common in tropical countries in all parts of the world, is used in Liberia for gravel and kidney complaints. A wineglassful of the decoction is taken when cold, three times a day, tea and coffee being forbidden during its use. The leaves are broadly lanceolate, serrate, thin, and smooth. The two-valved fruit when mature dehisces septicidally, showing the placenta and seeds free in the centre. The plant is herbaceous, one to three feet high, and much branched, the leaves and branches being usually in whorls of three. The small white flowers have remarkably slender, short pedicles and are arranged in a racemose manner.

"*Sassy Bark*" (*Erythrophlœum Guineense, Don*).—This tree is abundant in Liberia, but is only used as a poison. Its medicinal properties have only recently been investigated by Dr. T. Lauder Brunton ("Lancet," March 17th, 1877, p. 377), and it has also already been figured in the "Pharmaceutical Journal" (1 vol. xvi, p. 235).* Ph. J. Trans., Jan. 19th, 1878, p. 563.

List of Drugs kept in an Apothecary Shop of Nördlingen in the Fifteenth Century.—Dr. F. A. Flückiger, in 1872, published under the name of "*Frankfurter Liste,*" a list of drugs kept in the apothecary shops of Frankfort (on the Maine), about the middle of the fifteenth century, which he has supplemented and enlarged in his "*Documente zur Geschichte der Pharmacie,*" communicated to the same periodical, the "Arch. f. Pharmacie," in 1875 and 1876. These communications gave the incentive to the publication of two additional lists: the one by Dr. Krause (Arch. f. Ph., 1876, p. 426), the other by E. Romminger (Ibid, p. 423). The latter claims to be—and is in all probability—an authentic list of the drugs kept in an apothecary shop of Prenzlau in the Uckermark, in 1303. The importance of these lists as contributions to the history of pharmacy, cannot be estimated too highly, since they afford insight into the condition of pharmacy during these early periods. Dr. Flückiger has now, through the efforts of Dr. Müller, Librarian to the Library of Strasburg, been placed in possession of a list of drugs, which, according to its inscription, appears to embrace those drugs which were regarded as indispensable in the apothecary shops of Nördlingen in the latter part of the fifteenth century (about 1480). The list was prepared—by order of the magistracy of Nördlingen no doubt—by the town physician, Dr. Mettlinger, and is authentic beyond dispute. It is carefully written upon both sides of 10 leaves (width 11, height 32 cm.), and embraces more than 600 articles, which are classified by Dr. Mettlinger as follows:

1. Ex aromatibus,	50
2. Ex seminibus,	48
3. Ex fructibus, succis, gummi, radicibus, etc.,	118
4. Ex de herbis, floribus, etc.,	96
5. Ex lapidibus, metallis, sale, etc.,	53
6. Ex medic. simpl. laxativis,	46
7. De adipibus,	24
8. De oleis, etc.,	21
9. De conservis,	42
10. De opiatis,	10
11. De syrupis,	22
12. De elixiriis, etc.,	31
13. De trochiscis, etc.,	21
14. De unguentis,	19
	601

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* E. Hardy and N. Galloid have discovered an alkaloid in the bark of the tree (see Proceedings, 1877, p. 217).—Rep.

Dr. Flückiger finds this list—the *Nördlinger Register*—to be even more copious than that of Frankfort. Many of the crude drugs embraced by the first 6 divisions he has commented on in his previous papers. Other drugs and preparations are commented on in the present paper. The names of a few of these were not intelligible, notwithstanding the distinct character of the writing. Arch. Ph., Aug. 1877, pp. 97–115.

Impressions from Plants.—A piece of paper is saturated with oil, folded to 4 thicknesses and subjected to a great pressure to facilitate the uniform absorption of the oil. The plant or leaf is now placed between the oiled paper, moderately pressed, then removed to clean paper and again pressed. The last paper is afterwards dusted over with finely powdered plumbago, or, better still, with a mixture of rosin and plumbago; on warming the paper with the adhering latter admixture a permanent impression is obtained. A. J. Ph., May, 1878, p. 260; from Apoth. Zeit., 1878.

Herbariæ.—Dr. Sommer, an apothecary of Schwarzenfels, near Cassel, Germany, furnishes for a moderate price a very complete "*herbarium vivum medicinale*," containing the officinal (Pharm. Germ.), as well as obsolete medicinal plants, together with those which are occasionally used as substitutions or fraudulent admixtures. Each plant is represented as completely as possible by root, leaves, flowers, fruit; they are arranged in natural families, labelled with the botanical name, author, habitat, and more important synonyms, together with German, English, and French terms. New Rem., April, 1878, p. 117; from Pharm. Zeitung, 1878.

Kossāla.—Prof. Dragendorff has received and subjected to proximate analysis an Abyssinian drug, named Kossāla, and composed of small brown seeds, the botanical origin of which he has been unable to ascertain. The drug has a reputation as a remedy in tapeworm, and is supposed to have been originally so applied by the inhabitants of the Amchara district, whence its use has been spread to other portions of Abyssinia within the past thirty years. The seeds are about 0.2 mm. long, about 0.1 mm. broad, indented from the sides, presenting kidney-shaped longitudinal streaks which are finely dotted. They are dark-brown externally, have a yellowish raphe, and are exalbuminous. An abundance of green fragments of a fruit capsule and the remains of the pedicle are found mixed with the seed. The drug is given in powder in doses of 34 grams divided into 3 portions, and mixed with honey, the first portion being given at night, the next in the morning, and the last 1½ hours later, mixed with a little castor oil. The tapeworm is said to pass on the second or third day in a partly putrefied condition. The analysis determined the following components in 100 parts of kossāla: Moisture, 6.37; ash, 5.96; albumen, 1.35; legumin, 2.85; other albuminoids, 6.74; (total nitrogen 1.71 per cent.); cellulose, 31.54, fibrose, etc., 10.89; pectin, 5.18; mucilage soluble in water, 6.00; saccharose or dextrin-like carbohydrate, 2.80; fat, 13.96; resin, soluble in ether, 0.25; resin soluble in alcohol, 2.55; bitter principle, 1.38; tannin acid, 1.83; vegetable acids, 0.24; oxalic acid or calcium salt, 0.11. Physiological experiments made with the drug, prove its tæniafuge properties; but the effect upon dogs and cats was attended with evident gastric irritation, which may render its application undesirable. Arch. Ph., March, 1878, p. 193–200.

Garrya Fremonti, Constituents.—D. W. Ross has isolated from the leaves of this California plant a bitter principle, apparently an alkaloid, for which he proposes the name of *Garryina.* The quantity of material obtainable was insufficient for a thorough determination of the character of this principle, which forms cubical crystals, is soluble in alcohol and water, and is precipitated from the aqueous solution by iodo-hydrargyrate of potassium. Sulphuric acid produces a purple color, bichromate of potassium and sulphuric acid a red color, changing to yellow and finally to green. The leaves also contain resin, chlorophyll, tannin, and sugar. They yielded five per cent. of ash, containing salts of potassium, calcium, magnesium, and iron. The root also contains garryina, together with starch, resin, and sugar. The ash, amounting to two and one-half per cent. of the root, contains the same bases as were found in the ash of the leaves. A. J. Ph., Dec. 1877, p. 585.

Japanese Isinglass.—Harry Napier Draper has received an authentic specimen of this product. It is in the form of flattened, somewhat contorted, and always curved threads, the longest of which does not exceed 6 cm., and they may perhaps be as accurately as possible described by saying that they resemble in form Nelson's opaque gelatin, but are very much more opaque and have much less color. That the substance is *not* isinglass may be at once decided by burning one of the threads, when it will be found that no odor of charred animal matter is evolved. It is turned blue by iodine, yet when examined under the microscope it gives no indication whatever of starch-granules. It is insoluble in alcohol, water, even after many hours boiling, dilute potash solution, acids, ammonia, ammoniacal sulphate of copper. But for its insolubility in boiling water, the author would be inclined to presume it to be the gelose of Pagen, a body extracted from *Gelidium cornelum* and other Algæ, which furnishes with boiling water a translucent jelly. Nor is it mentioned by Pagen that "gelose" is colored by iodine.

Since this paper was read Mr. Grindley has pointed out that this so-called Japanese isinglass dissolves readily in glycerin, and gives a clear firm jelly. This jelly is colored blue by iodine. Chem. and Drug., April 15th, 1878, p. 155.

ALGÆ.

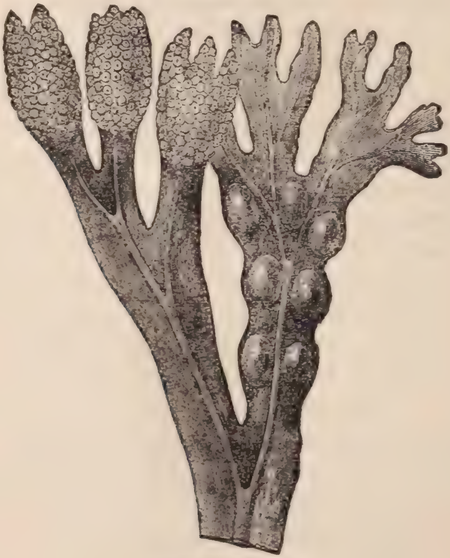
Fucus Vesiculosus.—The following from "New Remedies" (Nov. 1877, p. 322) will supplement the paper of Prof. Maisch on the same subject, abstracted from last year's report (see Proceedings, 1877, p. 116): About the year 1862, Dr. Duchesne-Duparc, while administering a preparation of "bladder-wrack" in a case of chronic psoriasis, observed, quite unexpectedly, that although the skin trouble was not benefited, the patient, who was the subject of excessive obesity, lost flesh without suffering any disturbance of the general health. Subsequent to his paper on the subject, Dr. Godefroy published the results obtained by personal use of the remedy. In this instance 4½ grains of an extract were taken thrice daily at the commencement of a meal, with the effect of reducing his weight nearly three and one-half pounds within thirty-four days. No change was made in the meantime in the ordinary mode of living, nor did his health suffer in any degree. The most marked evidence of the action of the drug besides the loss of flesh, is said to be an increased secretion of urine, which presents upon the surface a blackish film.

These two papers embrace about all that has been written upon the use of this remedy if the directions of Dannecy for preparing an *extract* are excepted. He says the plant should be gathered in June, and dried in the sun. When dried by artificial heat it does not become brittle, as it does when sun-dried, and it also retains hygroscopic properties. When sufficiently dry it is coarsely powdered and macerated for several days with four times its weight of 96 per cent. alcohol. It is then expressed twice, necessarily treated in the same manner with 54 per cent. alcohol; the tinctures are mixed, the alcohol distilled off, and the remainder evaporated to an extract, of which 3¾ grains may be taken three times daily, and increased gradually to about three times that quantity. A *syrup* may be prepared by dissolving a little of the extract in diluted alcohol and adding this to syrup in the proportion desired.

M. Duchesne-Duparc says that he has repeatedly been offered other varieties of *Fucus* and Gulf weed, under the impression that they were the proper variety; and since he claims that the property of causing solution of fat tissues resides largely, if not entirely, in *F. vesiculosus*, illustrations are given which will render it easy to distinguish the latter from the varieties which resemble it.

F. Vesiculosus.—The name "wrack," which is commonly given to the plant here shown, in the Channel Islands is *vraic*, and this is derived from the French *varec*, signifying *sea-weed*. A visitor to the seashore will find the rocks at low water covered with

FIG. 42.

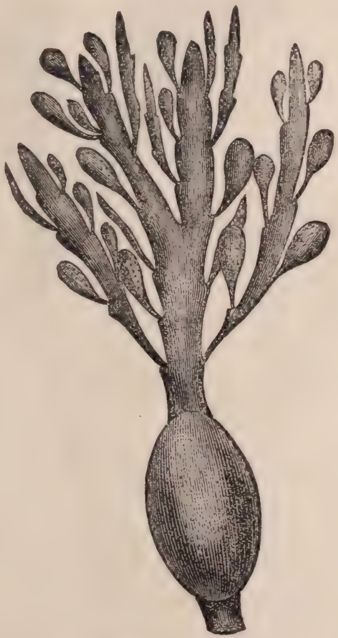


Fucus Vesiculosus.

dark olive-green sea-weed, presenting a variety of shapes, and after a heavy wind great quantities of these, with other forms of vegetable and animal life, will be left on the beach in long rows formed by the wash of the waves. The "Black Tang," or "Bladder Wrack," is generally the most common in their collections. · Its fronds are sometimes two or three feet in length, and fork again and again into what may be called branches. A stout midrib runs through the centre of each branch quite to the extremities of the fronds. Arranged in pairs along the branches, as shown in Fig. 42, are watery tubercles filled with air, which render the "wrack" buoyant. The tips of some of the fronds are swollen and covered with little tubercles, which, when examined closely, will be found to contain the germ of the plant.

F. nodosus, the "Knotted Wrack," shown in Fig. 43, differs entirely in appearance from the variety just described; nevertheless it is very commonly mistaken for the *F. vesiculosus* and Duchesne-Duparc attributes much of the reported want of success to the use of it instead of the proper variety.

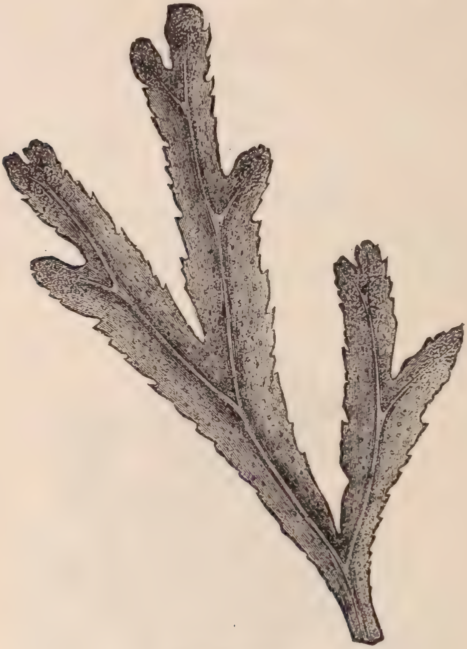
FIG. 43.



Fucus Nodosus.

F. serratus, the "Serrated Wrack" (Fig. 44), is a third and less common variety, but nevertheless sometimes mistaken for the one above mentioned. A midrib is present in its branches, which is not the case with *F. nodosus*, but it possesses no air-vesicles, and the edges of the fronds are jagged or serrated like the teeth of a saw.

FIG. 44.



Fucus Serratus.

Thao—A New Material for Dressing Textile Goods.—In "Moniteur de la Teinture" the following information is given regarding this substance: Thao is the gelatinous part of certain algæ employed in Cochin China. Its utilization extends to various manufactures, and its chief future seems to be in finishing stuffs. It may be extracted from certain sea-weeds from the coast of Bretagne. It has been said to be difficult of solution, and to be contaminated with a yellow coloring matter. If previously macerated for about 12 hours, thao may be dissolved in boiling water in ten or fifteen minutes. The solution, if strained and stirred till completely cold, does not congeal into a jelly, but remains fluid, and can thus be applied cold without injuring the colors of the stuffs. The yellow principle is eliminated by prolonged boiling, and is deposited in an insoluble crust on the sides of the pan. As thao dissolves only with the aid of heat, goods saturated with it are not affected by moisture. The solutions of thao do not turn mouldy, and have no action upon solution of permanganate. It may also be applied in the manufacture of goldbeater's skin. Ch. News, Aug. 10th, 1877, p. 63.

FUNGI.

Fungi.—E. B. Stuart has contributed a lengthy and interesting paper on "Fungi," embracing an outline of the systematic arrangement of this interesting class of plants. The paper is not of a character for profitable abstraction for this report. The Pharm., August, 1877, p. 225–235.

Polyporus.—Presence of a new organic acid. C. Stahlschmidt announces the discovery of a new organic acid in certain fungi of the family *Polyporus*, and which he has therefore named:

Polyporic Acid.—The empirical formula for this acid is $C_9H_7O_2$; it is yellow, and is so completely insoluble in water that the slightest trace of a soluble polyporate in water renders the liquid turbid on the addition of sulphuric acid. In virtue of this property the soluble polyporates may serve as indicators in alkalimetry, the turbidity serving instead of the usual change of color. It forms well-defined salts with all bases, of which the soluble ones, those of alkalies and ammonia, form a deep purple solution. On heating polyporates of potassium to redness in a combustion-tube along with zinc powder benzol was obtained, which was identified by its conversion into nitro-benzol, and thence into anilin. Ch. News, Sept. 14th, 1877, p. 120, from Liebig's Annalen, vol. 187.

Fungi—Occurrence of Oxalic Acid.—W. H. Hamlet and C. B. Plowright had noticed that some fine specimens of *Peziza venosa*, Pers., gave a strong acid reaction to test-paper, and on several occasions, both previous and subsequent, they had found a large number of Agarics and Polypori to be decidedly acid. Further opportunities developed the fact that a large number of Hymenomycetes, Peziza, and Sphæria gave a similar acid reaction, which, in every instance, was distinct and permanent, and the question, therefore, presented itself as to what free acid or acid salt could be so widely distributed throughout the fungus kingdom. To solve this problem a number of species were exhausted with pure water, filtered, and the filtrate examined qualitatively for acids, whereupon in every case a marked reaction for oxalic acid was obtained, and confirmed to be such. The acid was determined quantitatively in *Fistulina hepatica*, which is remarkable for its strong acidity; the amount of acid found corresponds to 0.083 per cent. It was determined qualitatively also—either free or as oxalates—in: *Agaricus* (*Amanita*) *phallorides*, Fr.; *Agaricus* (*Amanita*) *rubescens* Pers.; *Agaricus* (*Amanita*) *vaginatus*, Bull.; *Agaricus* (*Lepiota*) *procerus*, Scop.; *Agaricus* (*Clitocybe*) *maximus*, Fr.; *Agaricus* (*Clitocybe*) *laccatus*, Scop.; *Agaricus* (*Mycena*) *galericulatus*, Scop.; *Agaricus* (*Hypoloma*) *appendiculatus*, Bull.; *Lactarius rufus*, Fr.; *Lactarius torminosus*, Fr.; *Lactarius subdulcis*, Fr.; *Russula vitellina*, Fr.; *Cantharellus aurantiacus*, Fr.; *Panus torulorus*, Fr.; *Voletus luteus*, Fr.; *Boletus scaber*, Fr.; *Polyporus betulinus*, Fr.; *Polyporus rufescens*, Fr.; *Polyporus farinellus*, Fr.; *Lycoperdon giganteum*, Batoch.; *Lycoperdon gemmatum*, Fr.; *Leotia lubrica*, Pers.; *Peziza venosa*, Pers.; *Peziza rutilans*, Fr. From these and other facts before them the author concludes that all mature non-microscopic fungi contain oxalic acid either in the free state or in combination with alkalies or metals of the alkaline earths. The presence of oxalic acid in fungi has already been mentioned by Prof. Thompson (Greville's "Scottish Cryptogamic Flora," vol. iii), who found acid oxalate of potassium in *Polyporus sulphureus*, by Dr. R. Scott ("Trans. Linn. Soc.," viii, 268), who discovered oxalic acid in the same species; and, more recently, by De Bary ("Morph. und Phys. der Pilze," pp. 13, 14), who regards oxalate of calcium as a common constituent of fungi. But beyond this, the authors believe, no suspicion existed in the minds of mycologists of the extent to which the free acid or its compounds were present in the group of cryptograms. Ch. News, Aug. 31st, 1877, p. 93.

Ergot, Method of Preserving the Powder.—Mourrut recommends to mix freshly powdered ergot with 5 per cent. of powdered benzoin, whereby it will preserve its physical and medicinal properties without alteration. A. J. Ph., Sept. 1877, p. 443, from Rep. de Pharm, May 10th, 1877.

FILICES.

Aspidium Marginale.—Chas. H. Cressler has prepared by the process of the British Pharm., some oleo-resin of the greenish remains of the leafstalks, with adhering portions of the rhizome, of an evergreen fern, which he believed to be *Aspidium marginale*. The experiments made with the oleo-resin, so prepared, have proven it to possess decided tæniafuge properties, two instances being recorded by the author in which it was used, and in each case successfully, for the removal of the tapeworm. In one of these cases it was administered in capsules; ʒij of the oleo-resin being divided in nine capsules, and constituting a dose, followed an hour and a half afterwards by a dose of citrate of magnesia.

Prof. J. M. Maisch, having received living plants and herbarium specimens of the same, has recognized the fern to be, as Mr. Cressler had supposed, *Aspidium marginale*, Sw. This species of aspidium is, according to Gray, very common in the northern section of this continent, is of frequent occurrence in the rocky woodlands of Pennsylvania, and is met with farther south to the mountains of North Carolina. The *true male fern*, *Aspidium Filix-mas*, occurs in rocky woods of the Keweenaw peninsula of Lake Superior and westward, and according to Porter and Coulter's Flora of Colorado, also in the Grand Cañon of the Arkansas, and along the foot-hills west of Denver. It agrees with *Asp. marginale* in having the stipes or leafstalks covered at the base with a copious chaff of brown glossy scales, the fronds or leaves twice pinnate, with the upper pinnules confluent, and the lower ones more or less pinnatifid-toothed, and with some of the veins repeatedly forked. But the two species differ in the frond of *Asp. marginale* being evergreen, and having the fruit-dots close to the margin, while in *Asp. Filix-mas* the fruit-dots are near the mid-vein, and the fronds do not survive the winter. The rhizoma of the latter attains a thickness of one inch, and shows upon the cross section about ten larger, besides several smaller, and the stipes about eight irregular wood bundles, the former being arranged in a loose circle. The rhizoma of *Asp. marginale* is thinner, about ⅜ inch in diameter, and contains a loose circle of about six larger and smaller, and the stipes six very small wood bundles; otherwise the appearance and sensible properties of the subterraneous portions of the two plants resemble each other very closely.

Mr. Patterson (in Proceedings, 1876, p. 121) proved the constituents of *Asp. marginale* to be identical with those of the male fern, and Mr. Cressler has now shown that the therapeutic action also is equal. Prof. Maisch, therefore, draws attention to the propriety of placing the two varieties on an equal footing in the next Pharmacopœia, and that, in the meantime, pharmacists submit preparations of *Asp. marginale* for the use of physicians, and that the results obtained be duly recorded. In preparing the oleoresin, it must not be overlooked that only the green portion of the subterraneous parts be used, and that all the brown and decayed portions be rigidly excluded. A. J. Ph., June, 1878, pp. 290–293.

AROIDEÆ.

Caladium Sequinum, Vent.—This plant, commonly called *Dumb cane*, indigenous to South America, the West Indies, and Southern United States, and sometimes cultivated in gardens, is considered by some to be one of the most poisonous members of the vegetable kingdom. Its stem attains a height of 3–7½ feet, the leaves being attached to its upper part in the shape of a crest. The latter are oblongly ovate, pointed, and covered with white speckles. The spathe has a pale-green color, and is shorter than the spadix, which bears flowers exhaling a cadaverous odor. The juice of the fresh plant is exceedingly acrid and caustic, so that even very small quantities of it, carried into the digestive apparatus, produce inflammation and dangerous intoxication. A single drop sprinkled upon the skin produces an intense itching and burning, and afterwards inflammation. Some persons appear more susceptible to its effects than others.

The rhizome seems to contain a more diluted juice, and has been recommended by American physicians. Scholz first used and administered a tincture of the leaves and flowers (which see). It is remarkable that the tincture exhibits the peculiar acridity of the fresh juice only in a faint degree. The reason for this is that the fresh juice contains small microscopic crystals (raphides), perhaps an oxalate, which pierce the pores of the skin and set up an inflammation. It may, perhaps, be best given in the form of the mixture, known as Mistura Antipruritica, Scholz. (See Misturæ). N. Rem., April, 1878, p. 111.

GRAMINACEÆ.

Triticum Repens—Chemical examination.—In some localities this weed occurs very abundantly, and being very difficult to exterminate, its utilization as food for cattle must be regarded of great importance. Ant. Barral prepares from it a meal, which has a pleasant odor, a good taste, and is eaten by cattle with eagerness. 100 p. of the dry plant produces 65 p. of meal. These considerations induced Plauchud to subject the plant to chemical examination. From 100 parts of the dry plant, he obtained:

Crystallizable sugar,	3.0 parts.
Uncrystallizable sugar,	4.0 "
Starch,	13.9 "
Fat,	1.115 "
Nitrogen,	1.45 "
Mineral constituents,	3.25 "

In 100 parts of the ash he found: 20.0 silica, 10.90 phosphoric acid, 12.35 sulphuric acid, 8.42 lime, 2.04 magnesia, 26.23 potassa, 5.06 soda, and 2.40 oxide of iron. The bases are also present, partially, as carbonates.

The starch, which might be produced industrially from this source, possesses some remarkable peculiarities. A transverse or longitudinal section of the plant, when viewed under the microscope, shows regular, six-sided, oblong (1:2) cells, filled with starch-granules. These granules have a diameter of 0.006 to 0.008 mm.; their form is almost invariable that of a cylindrically coniform ball, somewhat flattened above and hollowed beneath. It is not changed perceptibly when immersed in cold water for twelve hours, either in form or size. It is, like other starches, blued by iodine. Viewed in polarized light the granules exhibit a handsome cross of St. Andrew, the centre of which corresponds to the hilum. If a section of the rhizome, cut parallel with its axis, is examined in water or in glycerin, the cellular membrane exhibits—after the starch-granules have been washed off—some less transparent spots which reflect the light; the cell appears dotted, since the thickness of its walls, owing to the indentures made by the pressure of the starch-granules, becomes readily recognizable. These various characters enable the certain distinction of the starch of the couch-grass from the starches of other plants.

The percentage of nitrogen (= 1.45 per cent.) contained in the couch-grass, compares favorably with that of many other plants used as food for cattle—such as rye, potatoes, beets, clover, etc.—which contain from 0.30 to 1.70 per cent. nitrogen. Independent of its value as food for cattle, couch-grass may be usefully applied to various industrial purposes. The fibre answers very well for the preparation of paper; while the 7 per cent. of sugar and 13.9 per cent. of starch (corresponding to 15 per cent. of sugar) which it contains renders it valuable for the preparation of spirit. Zeitschr. Œst. Ap. Ver., Oct. 1st, 1877, p. 457.

Flour, Detection of Mineral Adulterants.—Kessler proposes the following methods: 2 grams of the flour are formed into a thin paste with 20 cc. of water, which is then mixed with an equal volume of concentrated sulphuric acid. If the flour is pure a clear or nearly clear solution is eventually formed, and nothing will deposit; but if heavy spar, gypsum, or sand are present, these are deposited and may be readily recognized and their percentage determined. In the presence of chalk, the effervescence ensues on making the mixture, and the gypsum formed will subsequently also be deposited. If the acid is added gradually, a nearly colorless liquid is formed; if it is added rapidly, the liquid becomes brownish black, but the flour is dissolved more perfectly, and the resulting liquid being clearer, the mineral depo*s*ts are more readily recognized. Ph. Centr. H., Oct. 18th, 1877, p. 345.

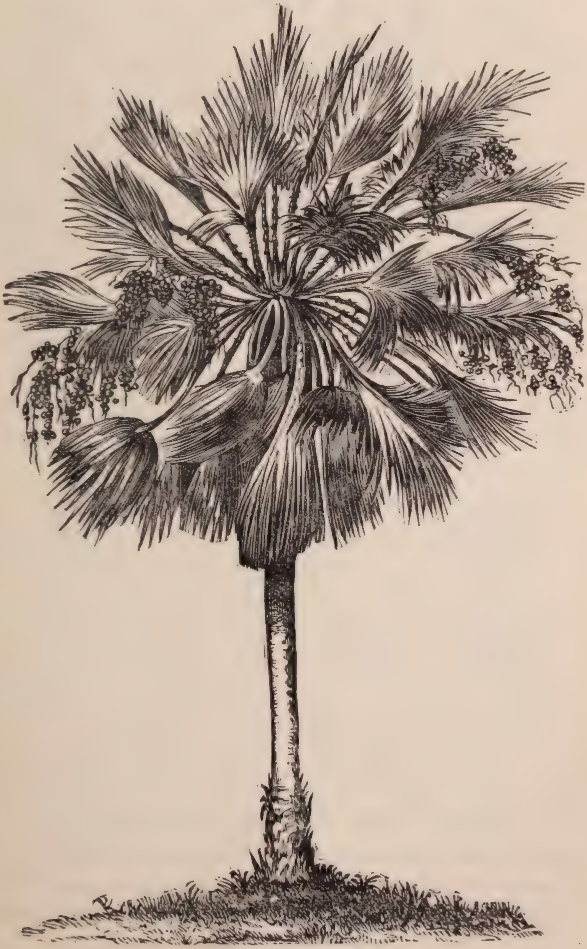
Indian Corn.—Attention having been drawn to the poisonous character of Indian corn which has undergone putrefactive change (see Proceedings, 1877, p. 123), and this being believed to be due to an alkaloidal substance similar to strychnia, Prof. Dragendorff has made some experiments, in which he was assisted by one Christowsky, with a view to determining the correctness of the previous views. Operating with healthy maize, subjecting this to putrefactive action, and also to the influence of a saline solution corresponding to sea-water, he found as a result of the long series of experiments made, that under none of the conditions named was there formed a substance having the action or character of strychnia. His results do not, however, necessarily dispute the poisonous character of putrid maize. Arch. Ph., March, 1878, p. 207.

Bamboo—Supposed to produce Fever.—From a report of Major Peyton, one of the present officers of the Bombay Presidency, a singular statement is given in connection with the flowering of bamboo. He states that for the last ten years he has noticed in Kanara, that wherever the bamboos flower and seed, then fever, as an invariable rule, prevails. In 1866, immediately below the Guáts, and in 1867 and 1868, towards the eastern part of the district, it was so, and more recently around Yellapur, where the bamboos flowered and seeded, fever became general, few escaping it. The type of fever that at first prevails is not unlike hay fever at home (in England), but this is when the flowering of the bamboos first sets in, and it changes into greater severity as the seeds begin to fall and ferment. Ph. J. Trans., Sept. 29th, 1877, p. 248.

PALMACEÆ.

Copernicia Cerifera, Mart.—From an interesting paper on the wax or carnauba palm of Brazil, in "New Rem." (Sept. 1877, p.

FIG. 45.

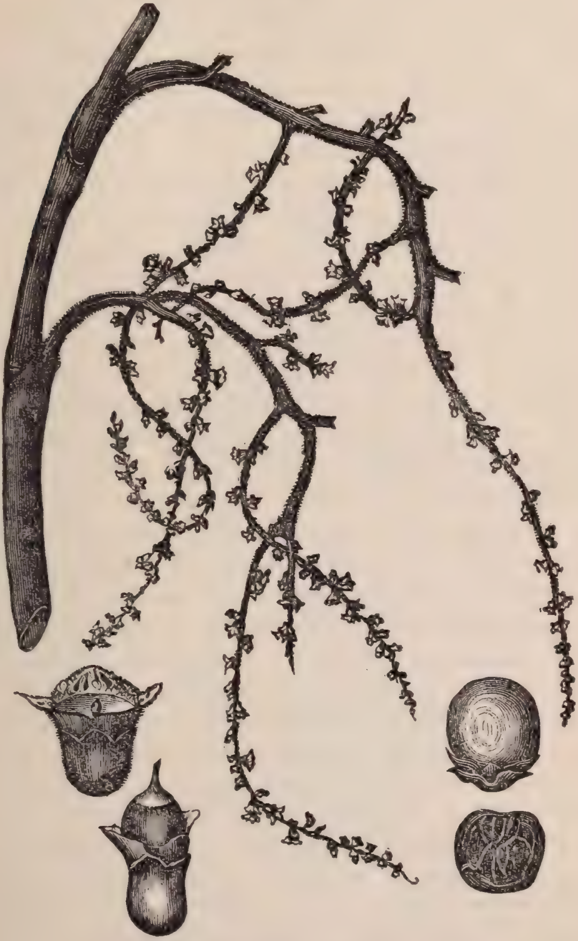


Copernicia Cerifera.

259) the following is extracted. "The natives inhabiting the extensive plateaus in the northern provinces of Brazil, which are covered with forests of carnauba trees, derive from it nearly all their means of existence and comfort. The wood, which is very light, but exceedingly hard, is used as timber for houses, fences, and for making all kinds of furniture and utensils; the leaves are used as a covering for roofs, and for beds; the leaf-fibres are woven into mats, baskets, hats, and brooms; the leafstalk contains an elastic pith answering the purposes of cork; the hollow stems are used as water conduits; and the fruit kernels, roasted, furnish an agreeable beverage, known as café de carnauba. But the most valuable product of the tree is the so-called *carnauba* or *carnahauba* wax (palm-wax), which has become an important article of commerce. The Copernicia cerifera, Mart. (*Corypha cerifera*, Arr.), has a stem 6 to 12 inches in diameter, and attains a height of 30 to 100 feet. The leaves arise from the extreme end of the stem (see Fig. 45), are of a bright-green color, fan-shaped, and terminate at the apex in sharp points. The solitary flowers along the spadix are very small (see Fig. 46), hermaphrodite, with a three-petalous corolla, externally of a green, internally of a chestnut-brown color. The first consists of an exterior slightly sweet pulp, which is considered a great delicacy, and is covered with a dark-red or almost black skin. It incloses a round, hard seed, containing on oleaginous almond-like kernel. The latter, when pounded, yields a sort of flour, forming an agreeable nutriment, with milk, or a refreshing drink, when mixed with water and sugar. The terminal leaf-bud, or so-called palm-cabbage, is quite small, but extremely savory and nutritious, as it contains an abundance of fecula resembling sago. The wax is secreted by scales, situated in the axillæ of leaves, and is found on both surfaces of the scales, that on the upper surface readily detaching itself and falling on the ground when the tree is shaken. The method of collection is as follows: The young leaf-buds and scales are cut off, dried for a few days, pounded, and the powdering part falling off, is melted in earthen vessels with a little water. A more careful process appears to be practiced at Aracati. The men split the buds with knives and hand them to the women, who carefully beat out the powdery substance with small sticks, upon an outstretched cloth. It is then melted, as before stated, and constitutes crude carnauba wax.

Carnaüba Wax has a bright-yellow color, with a greenish shade, is harder than beeswax, melts at 84° C. (= 184° F), and

Fig. 46.



Copernicia Cerifera.

has a sp. gr. of 0.999. According to Nevil Story-Maskelyne (Jour. Ch. Soc., vii, 87), it consists mainly of compound ethers of melissyl-alcohol, which may be obtained from it in considerable quantities by saponification. It also contains another alcohol ($C_{23}H_{48}O$), small quantities of resin, and a substance melting at 105° C. (= 221° F.), and having the composition $C_{39}H_{82}O_3$. But, according to Berard

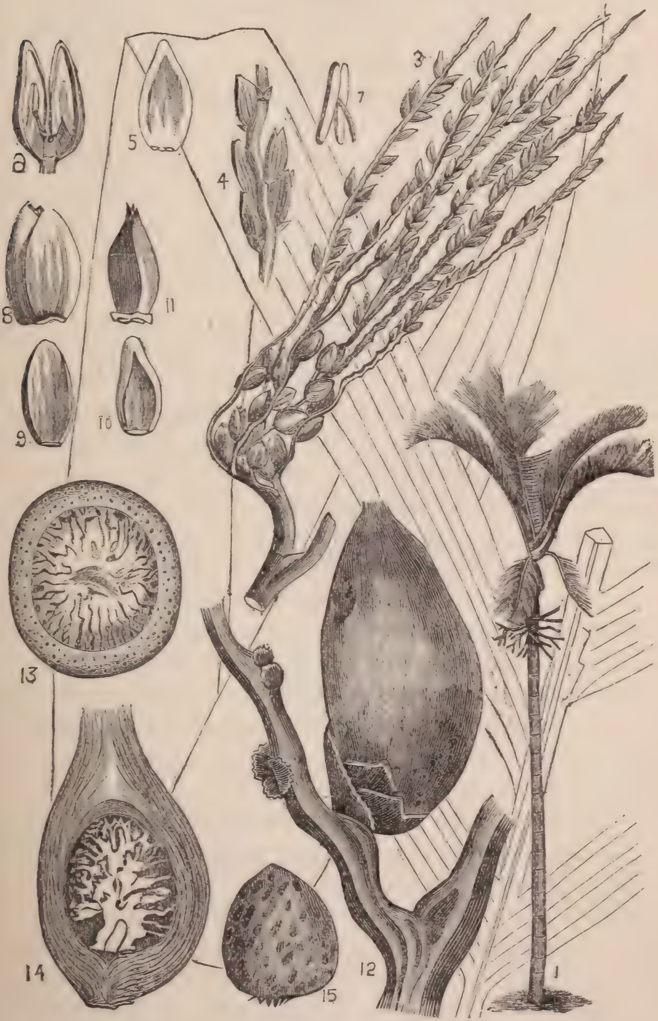
(Bull. Soc. Chim. (2), ix, 41), that portion of wax which is soluble in alcohol, is free cerotic acid, $C_{27}H_{54}O_3$, while the remainder corresponds to melissylic ether. The wax is used in Brazil, mixed with tallow, for candles, and is used extensively in Europe and in the United States for preparing varnishes, waxed leather, candles, etc. The root, under the name of *carnaubia root*, has been used medicinally by the natives, and is supposed to be an efficient substitute for sarsaparilla; but it is entirely destitute of medicinal properties.

Areca Catechu.—The accompanying illustration (Fig. 47), together with a description of the *areca*, or *betel-nut*, is given in "New Remedies" (April, 1878, pp. 98, 100). The areca nut palm is a most elegant palm, with a straight, smooth trunk, 40 to 50 feet high, and about 20 inches in circumference. The inflorescence is arranged on a branching spadia, with the male flowers on its upper portion and the female near the base. The leaves are few, from 6 to 9 only, all terminal, spreading, very large and long. The tree is cultivated in the Malayan Archipelago, the warmer parts of the Indian Peninsulas, Ceylon, Indo-China, and the Philippines. It is probably indigenous to the first-named region. The areca nut is, on an average, about the size of a nutmeg. It is roundish conical in form, flattened at its base, of a reddish-brown or rusty-gray color externally, and marked conspicuously with a hilum and a network of veins, which gives the surface a somewhat tessellated appearance. They are hard, heavy and difficult to break or cut, but, when broken, the nucleus is seen to present a somewhat marbled appearance, like that of the officinal nutmeg, and caused by the passage inwards of the reddish-brown veins, which are seen on the surface, into the whitish albumen or endosperm. The albumen is, therefore, of the kind called ruminated. At the base of this albumen the small conical embryo may be observed. Areca nuts have no marked odor, although they have been described as somewhat cheesy. Their taste is feebly astringent. A good description of the chemical components of the betel-nut is given by Flückiger and Hanbury.

MELANTHACEÆ.

Colchicum Root—Relative Value.—Theodore F. Beckert has made some experiments with a view to determine the relative value of colchicum root of variable appearance and age. It has been noticed that the colchicum root presenting a clear white fracture on breaking is of late difficult to obtain. The recently imported article, also, appears to consist of tubers which had been sliced very irregularly. Out of a pound lot not less than seven whole tubers were taken, the remainder varying from one-sixth to one-half inch in thickness. These pieces, when broken,

FIG. 47.



Areca Catechu.

presented quite a varied appearance, their color being all shades between white and black; and it was noticed that the light-colored roots were mostly easy to break, and many of them of a mealy character, whereas the darker ones were difficult to break, and had a somewhat resinous appearance. To determine the relative value of these, a quantity of the root was broken piece by piece, and then separated into three grades—white, slate-colored and brown or blackish—and these portions separately subjected to examination. A sample of very old (at least 10 years) was examined at the same time. By suitable methods, solutions containing the alkaloidal constituent of the various samples were obtained, and the alkaloid determined in them by Mayer's solution and as tannate, with the following result:

	1st grade. (White root.)	2d grade. (Gray root.)	3d grade. (Black root.)	Very old root.
Mayer's solution necessary to precipitate 1 cc. of the solution.	0.0403	0.0414	0.0492	0.0300
Percentage of alkaloid in air-dry root.	0 205	0 210	0.219	0.152
Tannate precipitate obtained from five Troy ounces of root.	0.320	0.265	0.270	
Amount of crude colchicia obtained from the tannates.	lost.	0.115	0.104	

These results lead the author to the opinion, that the virtues of the fresh root are but little affected by the color of the fracture, but that the *age* is of primary importance, and that none but fresh-looking root should be purchased. A. J. Ph., Sept. 1877, p. 433.

Colchicum Seed, Chemical Examination.—Nathan Rosenwasser has prepared the active principle of the seed, and found it to have a neutral reaction to test-paper, and to be not precipitated from aqueous solutions or solutions acidulated with organic acids, by potassio-mercuric iodide, phospho-tungstate of sodium, chloride of gold, phosphomolybdic acid, or solution of iodine, all of which reagents afforded precipitates after the solution had been acidulated with a mineral or oxalic acid, or had been boiled a few minutes with acetic acid; he argues from this that the principle is naturally neutral, and is converted into an alkaloid by the influences mentioned. The neutral substance, *colchicin*, was with some difficulty obtained in crystals by the slow evaporation, in deep vessels, of its solutions in fusel oil or benzol, and was found to be insoluble in *pure* ether, bisulphide of carbon, and petroleum benzin. The author obtained 5 grains of colchicin from 5000 grains of the unbroken seeds, and from the same seeds, after crushing, he obtained 11 grains more. This completely contradicts the assertion that the active principle is contained chiefly in the outer integument of the seed. An aqueous distillate from the seed had an aromatic odor, but no volatile oil was separated. The amount of fixed oil in the seed was found to be 8.4 per cent. Flükiger and Hanbury give the amount at 6.6 per cent. A. J. Ph. Sept. 1887, p. 435.

Chamœlirium Luteum, Gray (*Syn. Helonias dioica*).—F. V. Greene, M.D., reviews the therapeutic literature on chamælirium luteum, described under its old name, *Helonias dioica*, in the United States and American (Eclectic) Dispensatories. The action of the root as a uterine tonic seems to be well established, and it seemed, therefore, interesting to subject it to proximate investigation. By extracting the root with water, adding magnesia, evaporating to dryness on a water-bath, powdering, again heating on a water-bath, and placing in a warm closet for some hours, he extracted by hot absolute alcohol a quantity of an intensely bitter principle. If the magnesia mass is not thoroughly dried, the principle is accompanied by glucose. In this manner about 9.1 per cent. of the bitter principle, which the author proposes to name

Chamælirin, was obtained. This, when dissolved in water, deposited a white substance, not examined nearer, which may be removed by taking advantage of its solubility in ether—chamælirin being insoluble in that liquid. Chamælirin constitutes an opaque, amorphous, light buff-colored substance, which is readily reduced to a powder of much lighter color. It is freely soluble in water, cold and hot, and in alcohol; is a glucoside, as determined by various appropriate experiments, and, as its aqueous solutions froth considerably, is possibly allied to saponin. It gives no color reactions with concentrated acids that are noteworthy; is freely soluble in ammonia, but is precipitated from its solutions by strong solutions of fixed alkalies, and also by caustic baryta, and by phosphomolybdic acid; the latter precipitate being yellowish-white and dissolving in ammonia with a blue color, which disappears on heating. Tannic acid, acetate of lead, potassio-mercuric iodide, iodine in iodide of potassium solution, potassio-cadmic iodide or metatungstic acid do not precipitate it from its solutions. A. J. Ph., May, 1878, p. 250.

LILIACEÆ.

Aloes—Solvent Action of Glycerin.—Attention is drawn to the usefulness of glycerin in connection with aloes. When the latter is treated with glycerin in the cold, it slowly dissolves, forming a dark but transparent solution, more or less viscid, according to the proportions. By the aid of heat, the aloes appears to be dissolved to a very large extent, forming either a mass of pilular or of softer consistence, as may be required. The addition of glycerin to aloes appears to modify its action, which is more quick and energetic, and attended with less irritation than when given in other ways. Chem. and Drug., Aug. 1877, p. 306.

DIOSCOREACEÆ.

Dioscorea Villosa, Lin.—Prof. J. M. Maisch describes the plant, known as the *wild yam*, and particularly its rhizome, which is regarded as possessing antispasmodic, diaphoretic, expectorant, and emetic properties, and has, among other complaints, been recommended in bilious colic in the form of infusion, made with one ounce to the pint, one-half being taken at a dose. In Virginia, and probably in other States, it is known among the negroes as *rheumatism root*, it being considered a sure cure in that complaint. The wild yam is the only representative in the United States of the nat. ord. "Dioscoreaceæ." A number of species of the same genus occur in the East and West Indies, but their rhizome has a very different appearance from the indigenous species. The rhizome of the wild yam is horizontal, about one-half inch in diameter, somewhat flattened from above, repeatedly forked or branched in various directions, so that the entire rhizome covers a space of 6 to 12 inches in diameter, the branches bearing a slight resemblance to ginger. Upon the upper surface at irregular distances are the circular scars, left by the overground stems; beneath and on the sides, at a distance of about half an inch, are simple wiry rootlets about 2 to 4 inches long. Rhizome and rootlets are of a light or yellowish-brown color, and break with some difficulty, exhibititing a compact white tissue with numerous scattered wood bundles of a yellowish color. Odor is absent, the taste, at first insipid, soon becomes strongly acrid. This acridity is impaired by boiling, either through alteration or volatilization ; it has not been investigated.

The exotic species are generally cultivated in tropical countries for their tubers, which attain considerable size, weighing frequently thirty or forty pounds, and, though quite acrid in the fresh state, are cooked and used as food. They contain from 15 to 18 per cent. of starch, but may occasionally reach 24 per cent. (Sheir, 1847), or fall to 8 per cent. (Grouven, 1856.) A. J. Ph., Feb. 1877, p. 56.

AMARYLLIDACEÆ.

Narcissus Pseudonarcissus—Proximate Principles.—A. W. Gerrard has subjected the bulbs of the daffodil to chemical examination. All parts of the plant, especially the flowers, are reputed to be poisonous, but the bulbs only were obtainable. By suitable methods of extraction he obtained a crystalline substance, which he is inclined to regard as a *neutral principle*, and an amorphous substance which proves to be an *alkaloid*, and which he proposes to name

Pseudonarcissia.—This he was unable to obtain in a crystalline condition, and, on account of the small quantity obtained (about 6 grains from a pound of the fresh bulbs), he has not completed its chemical investigation. The nitrate, however, appears to be crystallizable. Besides a *peculiar sweetish body*—not sugar—no other principle of importance was isolated. The sweetish body does not reduce cupric tartrate in the cold, but does so immediately on boiling. Physiological experiments made with the alkaloid and an extract, by Professor Sydney Ringer, show that in warm-blooded animals, the alkaloid given hypodermically, in doses of three or four grains, causes profuse salivation, with running at the eyes and nose, also free vomiting and slight diarrhœa. On man, administered by the mouth, it was found to act as on animals. The extract, in some respects, is far more powerful than the alkaloid. Eight or ten (grains ?) excite nausea and vomiting, but produce no salivation. Hence it is probable that the principle producing the salivation and that producing the emetic and purgative action are distinct. Yearbook of Ph., 1877, p. 536.

IRIDEÆ.

Crocus Sativus—Delicate reaction of its coloring principles.—W. W. Stoddart, during an investigation of some confections, discovered a very interesting and delicate reaction for the coloring matter of saffron. A dilute solution of saffron is discolored upon the addition of an excess of hydrochloric acid; if now a crystal of sugar is dropped into the test-tube, and the liquid is boiled, the original color will immediately return, and is accompanied by a beautiful and characteristic red fluorescence, which is especially observable on the surface of the liquid. It is necessary that the infusion should be very dilute, and also that sugar should be present, for in its absence the color is not restored. One part of the stigmata, infused in 23,232 parts of water, shows the reaction very decidedly. The author regards polychroite, the coloring principle of saffron, to be a compound of two coloring matters, a red and a yellow. As a mean result of several analyses, he gives the following as the composition of the stigmata: Polychroite, 62.31; volatile oil, 1.32; sucrose, 0.43; glucose, 0.11; gum, etc., 7.50; cellulose, 9.64; ash, 6.82; moisture, 10.87 per cent. Weiss, who has devoted considerable attention to the composition of saffron, found the volatile oil to be isomeric with carvol ($C_{10}H_{14}$) ($0 = 16$), and that by age it is converted into a white solid, possessing the character and composition of thymol. He has also found that polychroite is decomposed by the action of acids, and assimilating an atom of water, it is split into crocin, carvol, and glucose; the first-named being a red substance. Mr. Stoddart criticizes this view of Weiss, and believes it to be incorrect, because, when an infusion of saffron is boiled with hydrochloric acid, a copious flocculent precipitate of crocin is formed, which is quite insoluble in water; the supernatant solution, however, contains a yellow coloring matter, which is not accounted for by the decomposition of polycroite as given by Weiss. The author promises to give the subject further attention. Yearbook of Phar., 1876, p. 494.

Dr. A. Patze breaks a lance for saffron, which he finds in his practice to be really a valuable medicine. The disrepute into which it has fallen in this country, is due to substitution, adulteration, and inferiority of the drug (by age or otherwise). He maintains that all its virtues being vested in the aromatic principle, it should only be employed when known to be fresh; and when of good quality, it is very effectual for the alleviation of the griping pains accompanying summer complaint (cholera infantum). In overdoses the drug produces delirium, vertigo, intolerable headache, drowsiness, paleness, spasms, sardonic laughter, and finally death from congestion of the brain. In females it causes severe uterine hæmorrhages. The author refers to various authorities in support of his views of its value as a therapeutic agent. New Rem., March, 1878, p. 78.

AMOMEÆ.

Ginger.—John Stenhouse and Charles E. Groves have made some preliminary examinations of ginger, with a view to determine the nature of the resinous substance to which its pungent character is due, but the experiments made do not appear very promising. The ground ginger, *Zingiber officinale*, from Cochin-China, was extracted by boiling with alcohol and the solution evaporated after filtration. The viscid residue had a strong odor of ginger, and when heated in a current of steam yielded a small quantity of essential oil, lighter than water. A portion of the extract was fused with three times its weight of soda, and the product neutralized with acid, and extracted with ether in the usual way. The ethereal solution on evaporation left a mass of crystals impregnated with a dark-colored liquid; these, after purification by pressure and two or three re-crystallizations from water, were examined and proved to be pyrocatechuic acid. They gave the ordinary well-known reactions of pyrocatechuic acid, and fused at the same temperature. Ph. J. Trans., July 28th, 1877, p. 70.

Elettaria Cardamomum, Maton.—After giving an account of the cardamom plant, taken from "Pharmacographia," "New Remedies" (Dec., 1877), gives the following account of its cultivation, taken from the work of Mr. Elliott,* a practical planter of Mysore: "Some time in February or March, the felling party, one-half of them provided with axes, and the rest with large hack-knives for cleaning the underwood, proceed to the forest, with the necessary supplies of food, and commence operations by building near to some stream a temporary hut to shelter them at night. The next morning the head man of the party, who is necessarily well acquainted with the forest, and who has previously chosen the sites for the projected gardens, points out to the coolies the trees that are to be felled. Half of the party then commence to clear the underwood, while the remainder set to work with their axes and fell the large forest trees. The Coorgs have an idea that it is of great importance that the ground should be well-shaken by the fall of some heavy tree, and if from any cause a tree does not crash down with sufficient force they fell another across it. Each plot generally consists of about the tenth part of an acre, and care is taken to leave about twenty to thirty yards of jungle between each garden, as well as not to make too many gardens in one year, lest there should be a too great and sudden diminution of the moisture, which is so much required by the cardamom plants. From fifty to one hundred gardens are made annually until the whole jungle is under cultivation. If presented in a plan, a cardamom jungle, fully cultivated, would be not unlike a checker-board. In May, during the early rains of the southwest monsoon, the young plants shoot up all over the cleared ground, but especially near the roots and stems of the fallen trees. By the October following they will have grown three or four inches, and by the ensuing February will have attained a height of about one foot, with from three to ten leaves on each plant. The seeds ripen in October, and in the fourth year, or about three years and a half from the springing up of the plant, a small crop, called by the Coorgs "God's fruit," will be gathered. At this time each rhizome will have thrown up about eight stems (see Fig. 48). After the plants have grown to the height of two feet the gardens must be annually weeded. When the trees have reached the height of about four feet, or say in the third year, a little culling will be required, for each plant must have six feet of clear ground left around it. In removing superfluous plants care must be exercised to preserve the strongest and healthiest-looking specimens. In the fifth year the plants will give a good crop, and will probably continue to do so for the following seven years, when they will present a sickly and exhausted appearance. It will then be necessary to select some large trees from the surrounding jungle and fell them right across the sickly plots. This is generally done during the months of February and March, when the lands were originally prepared for the cardamom, but may also be done with advantage some months earlier. Young plants will then spring up as before, and many of the old plants will have their stems and racemes killed by the fall, but from the rhizomes fresh stems will shoot and the plants bear with increased vigor for the next eight years, when the same process of renovation will have to be gone through again. The year in which the forest trees are thus felled the cardamom plots naturally give but little or nothing, and during the ensuing year but a slight crop will be gathered. But this very much depends on the quality of the soil, and on this also depends the early or late coming into bearing of the original garden. A cardamom jungle, if thus worked, never becomes exhausted, and the cultivation may be continued on the same land for an indefinite period. One rhizome will often have twenty stems, and as these are cut off, fresh ones spring up to supply their places.

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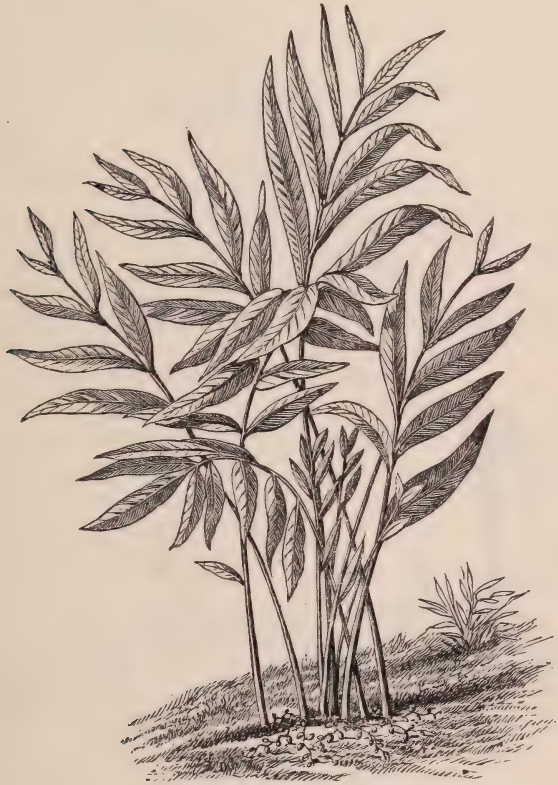
* Experience of a Planter in the Jungles of Mysore, London, 1871.

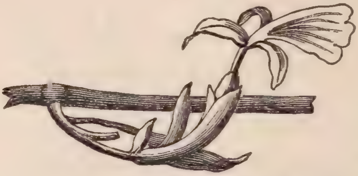
FIG. 48.



Elettaria Cardamomum.

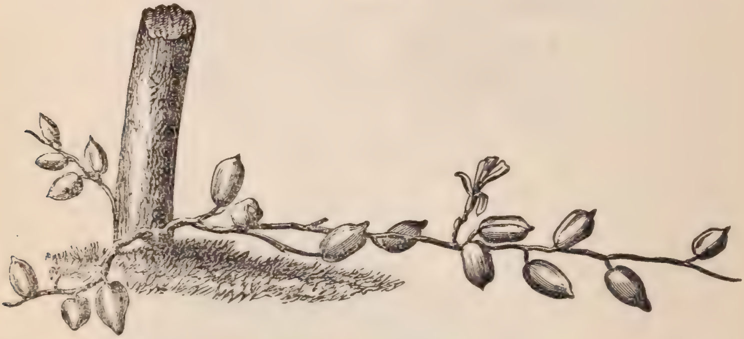
Flückiger and Hanbury describe the cardamom plant as "a flaglike perennial plant, six to twelve feet high, with large lanceolate leaves, on long sheeting stalks (see Fig. 48) and flowers (see Fig. 49), in lax flexuose horizontal scapes (see Fig. 50), six to eighteen inches in length, which are thrown out to the number of three or four close to the ground. Mr. Elliott observes that "the fruit is occasionally borne on the upper part of the stem, but this is extremely rare, and I may mention that in Munzerabad I have never seen or heard of an instance of this departure from the ordinary habit of the plant. When from the stem four racemes are thrown out it is called by the natives a true or full crop; if three only, a three-quarter crop; if two, half crop; and if one only, quarter crop. One raceme will have from eight to fourteen branches, and each branch from three to six pedicles. When the plant is grown under the most favorable conditions three branches are grown close together; when, however, the conditions are unfavorable, the racemes are long and weak and the branches far apart.

FIG. 49.



Flower of Cardamom.

FIG. 50.



Fruit of Cardamom.

POLYGONACEÆ.

Rheum Palmatum, L.—H. Werner communicates a lengthy paper on the origin of the rhubarb root, in which he endeavors to show that both the Chinese and Russian Rhubarb—so-called—

are obtained from the same plant, and that the plant now known as *Rheum officinale*, Baillon, is identical with *Rheum palmatum*, L. He became convinced that the plants were identical from the fact that Dabry (who used the roots from which Rheum officinale, Baillon, has been raised—see Proceedings, 1873, p. 211) and Przewalski (who brought the roots of Rheum palmatum, L.—see Proceedings, 1875, p. 145) travelled over the same ground, although starting from opposite points, and because, through a mistake in the identity of one of the plants cultivated in the Botanical Garden of Haage and Schmidt, of Erfurt, he had been assured that there was no observable difference in the plants growing side by side. In a supplement to his paper, the author is, however, compelled to acknowledge that his previous opinion is based on error. On inquiry it was found that Messrs. H. and S. had obtained young plants of R. palmatum, L., instead of R. officinale, B., as intended; hence their error. The author, nevertheless, adheres to the opinion that the rhubarb collected in Northern Thibet (between lat. 36° and 40°), is obtained exclusively from R. palmatum, L.; while he admits the probability that the rhubarb root collected in the more southern country may be that of R. officinale, B. Arch. J. Ph., Aug. 1877, p. 116–136.

Rheum Palmatum, var. Tanguticum.—Professor Balfour has received from Mr. G. P. Regel, Director of the Botanic Garden at St. Petersburg, five young rhubarb plants, under the name of *Rheum palmatum*, var. *Tanguticum*, the parent plant of which was collected by Col. Przewalski, on the northwestern range of mountains of Mongolia, in the Tangut country, and in the solitudes of Northern Thibet. It is known to the Mongols as "Sharamoto," or yellow tree, and to the Tangutans as "Djumtsa." The plant is quite distinct from *Rheum officinale*, which has lately been introduced into European gardens as the true rhubarb of commerce. The leaves of the plant are described as large, sometimes two feet long by three feet broad, and resemble *Rheum palmatum*, which has been cultivated in the Botanic Garden since the time of Dr. John Hope, Professor of Botany in Edinburgh, but they differ in being covered with longish and stiff hairs. The flower-stalk is said to attain a height of from seven to ten feet, with a thickness of half an inch near the ground. It does not branch, as in ordinary rhubarbs, but is more compact, the flowering branches coming off at a very acute angle, and running parallel to the stalk. The root, when full grown, is said to be about a foot long, and of the same thickness. The flowering time is the end of June or beginning of July, and the seed ripens towards the end of August. Ph. Trans., Jan. 26th, 1878, p. 588.

Rheum Officinale, Baill.—In a former paper (see Proceedings, 1877, p. 133) E. M. Holmes has expressed the hope that a further opportunity of examining the root might clear up the doubts as to the identity in structure of the true Russian rhubarb and the root of *Rheum officinale.* This opportunity has now been afforded, Mr. Usher, of Banbury, placing the author in possession of the root of a plant three years old, which presented the following features: The sympodium or cluster of rootstocks differ from the *Rheum rhaponticum* in its great size, and in the root forming a tuft at the base of the rootstock, and not springing from their sides. When the rootstocks were trimmed by depriving them of the roots and small lateral shoots, they weighed on the average about 8½ lbs., the central one being about 10 lbs. The rootstocks were nearly cylindrical in shape, tapering very slightly to either end, and about 6 inches in diameter in the middle, and from 15 to 18 inches long. The roots on the average were 1½ to 2 inches in diameter near their attachment to the rootstock, and tapering downwards. The rootstocks of some *Rheum rhaponticum* of eleven years' growth, were not more than a quarter the size. When the outer portion was carefully sliced off in different parts of the rootstock and root, it *nowhere* presented the characteristics of the true Russian rhubarb. The cortical portion was then removed in several places (this being always absent in Russian rhubarb), and the meditullium or central portion sliced in like manner, but no trace of the network, which so markedly distinguishes the Russian rhubarb, could be seen. These marks are well represented in "Goebel and Kunze," pl. ii, tab. 1, fig. 26. The transverse section of the rootstock also is not so finely grained, and although it is marked with many stellate spots, the markings are much larger and bolder than those of Russian rhubarb, and in fact more nearly approach to the markings on English rhubarb. The sections of the true roots present only a radiate structure without any stellate markings. In the author's opinion, the Russian root is produced by a plant which has much less rapid growth than the "noble *Rheum officinale*, Baill." From English rhubarb the rootstock differs chiefly in its paler color, much larger size, and in the abundance of large stellate markings

There is reason to believe that it is much stronger than the English kind, and probably equal to the East Indian. It will be tried at two London hospitals, and a report on its action doubtless made in due time. Ph. J. Trans., Sept. 8th, 1877, p. 181.

Rheum Officinale.—Harold Senier has compared the powder, infusion, and extract made from some of the root, provided by Mr. Holmes, with the corresponding preparations made from East India rhubarb and the root of *Rheum rhaponticum* (English rhubarb). *The powders* showed a marked difference in color, the *Rheum officinale* being the brightest, the East Indian coming next, and lastly *Rheum rhaponticum.* *The infusions*, when prepared according to the B. Ph., vary but little in color, that from *R. officinale* being a little darker than the other two. *The extracts* were made by using rectified spirit and also by the process of the B. P. By the latter method the East Indian root yielded 45 per cent.; *R. rhaponticum*, 29 per cent.; and *R. officinale*, 25 per cent. of extract. With rectified spirit as the solvent, the author obtained from the East India root 38 per cent.; from *R. rhaponticum*, 11 per cent.; and from *R. officinale*, 17 per cent. of dry extract. *The ash* was also estimated, and was found to be 12.72 per cent. in the East Indian root, 7.9 per cent. in the *R. rhaponticum*, and 4.66 per cent. in the *R. officinale.* On the whole, the results do not speak very favorably for *R. officinale*, grown in England, although its therapeutic value can only be determined by comparative physiological experiments. Ph. J. Trans., Dec. 8th, 1876, p. 444.

Java Rhubarb.—Professor Husemann states, that upon the Gunung Unarung and other mountains in Java there grows, at an elevation of two thousand to four thousand feet, a species of *Rheum*, the root of which forms an article of commerce, and is used by the Javanese as a purgative under the name of "*akar kelomba.*" Three varieties of this drug are met with in commerce: (1), *akar kelomba bras*, the top part of the root, with fragments of stalk still adhering; (2), *akar kelomba ketan*, the middle portion of the root; and (3), *akar kelomba keteba*, the bottom portion. Of the three the second named kind is the most valuable, whilst the top portion of the root combined with fragments of the stalk is of least value.

At present no information exists in botanical literature as to the plant from which the Java rhubarb is derived; but the Dutch

East Indian botanists ought not to find any difficulty in deciding how far the plant should be treated as a new species, or as one of the many continental East Indian species. J. H. Schmidt gives a detailed description of the best kind of Java rhubarb in the *Tydschrift voor Nederlandische Inde* (xvii, p. 98), according to which the root is fleshy, and long conical, or somewhat napiform. In some places it is still covered with a dark-brown rind, whilst the remainder is peeled and appears marbled with white and red. In a transverse section the rays run from the centre to the circumference, traversing the concentrical red-colored rings, and appearing to break off at the cambium, which forms a dense dark-brown, resinous-looking layer, from 1.1 to 1.5 millimeters thick. The most central concentric rings are bright red and alternate with yellow ones. At the centre, in some fissures resulting from the drying, are seen some fine white felt-like threads, having a silky lustre; the structure of these can be recognized under the microscope. In a longitudinal section are seen in the centre the almost rectangular parenchyma cells, partially filled with chrysophanic acid. With the aid of a glass cells containing crystals of oxalate of calcium can be detected. The Java rhubarb resembles the Chinese in smell and taste almost completely. The activity, according to experiments of Dr. v. Vogelpoel, is, however, one-fourth less, and this is explained, if the activity of rhubarb is due to chrysophanic acid, by the following analyses of the two varieties of rhubarb, made by Schmidt:

	Radix Rhei officinalis, per cent.	Radix Rhei Indici Javanicæ, per cent.
Rheo-tannic acid,	2.106	0.430
Phæoretin,	0.151	0.090
Chrysophan,	0.056	0.107
Chrysophanic acid,	4.700	1.646
Emodin,	0.580	2.000

From this it would appear that the rheo-tannic acid and chrysophanic acid are present in the Java root in much smaller proportion than in the Chinese, whilst the chrysophan and emodin are present in larger proportion in the Java root. Ph. J. Trans., Oct. 27th, 1877, p. 328.

Rhubarb—Analyses.—Prof. Dragendorff has made a series of analyses of various kinds of rhubarb, which give a clear insight into the composition of the various commercial kinds. The following are his results with Chinese and English rhubarbs :

	Chinese Rhubarb, per cent.	English Rhubarb, per cent.
Moisture,	11.25	11.09
*Ash,	6.32	3.20
Mucilage, soluble in water,	1.58	2.55
Arabic acid, soluble in water, not precip. by alcohol,	6.43	8.32
Metarabic acid,	5.70	3.22
Pararabin,	2.10	1.95
*Starch,	6.20	16.50
Cellulose,	7.64	4.29
Sugar,	4.29	4.40
Substance, readily soluble in water and in alcohol,	6.47	8.21
Cathartic acid,	4.88	2.50
Malic acid,	1.09	0.17
*Oxalic acid, in combination with calcium,	4.59	1.12
Free chrysophanic acid (soluble in petroleum ether),	trace	trace
Chrysophan and tannin,	14 17	4.83
Emodin, erythroretin, phäoretin, etc.,	1.15	5.89
Black-brown resin, soluble in alcohol and ether,		
White resin, crystalline, insoluble in alcohol, soluble in ether,	0.70	2.32
Fat,	0.15	0 17
Albuminous matter,	4 39	3.17
Paracellulose, vasculose, pectose, lignin,	10.90	16.10

The portions designated with a * may, perhaps, be utilized in investigations of questionable varieties of rhubarb. In a sample of Russian rhubarb, the author found 8.27 per cent. ash, 8.4 per cent. starch, and 3.28 per cent. of oxalic acid. Ph. Centralh., No. 22, 1878, p. 202; from Ph. Zeitschr. f. Russ.

CHENOPODIACEÆ.

Phytolacca Electrica—An Electric Plant.—Levy draws attention to a remarkable electric plant which he discovered (where? Rep.) during his travels. It is a Phytolacca, to which he has given the name P. electrica. He has observed, that when a branch is torn from the shrub, the hand is affected as powerfully as when it is in contact with a Rhumkorff's apparatus. The magnetic needle is affected at a distance of 7 to 8 steps from the shrub, and its influence is intensified as it is brought nearer, until, when placed in the centre of the shrub, the needle rotates with great rapidity. The electric qualities of this remarkable plant vary with the time of day, attaining their maximum at about 2 o'clock P.M., while at night it is reduced almost to nil. Ph. Centr. H., July 12th, 1877, p. 214.

Sugar Beets—Cultivation.—According to A. Ladureau, a hectare of good land, without manure, gave 48,000 kilos of roots with 10.80 per cent. of sugar in the juice; manured with the drainage of dunghills, 61,500 kilos, with 11.25 per cent. Soda saltpetre brought the percentage of sugar down to 8.36; earthnut cake to 9.61, and complete chemical manure to 10.07. The chemical manure was very useful in destroying insects. Chem. News, March 29th, 1878, p. 133; from Bull. de la Soc. Chim. de Paris.

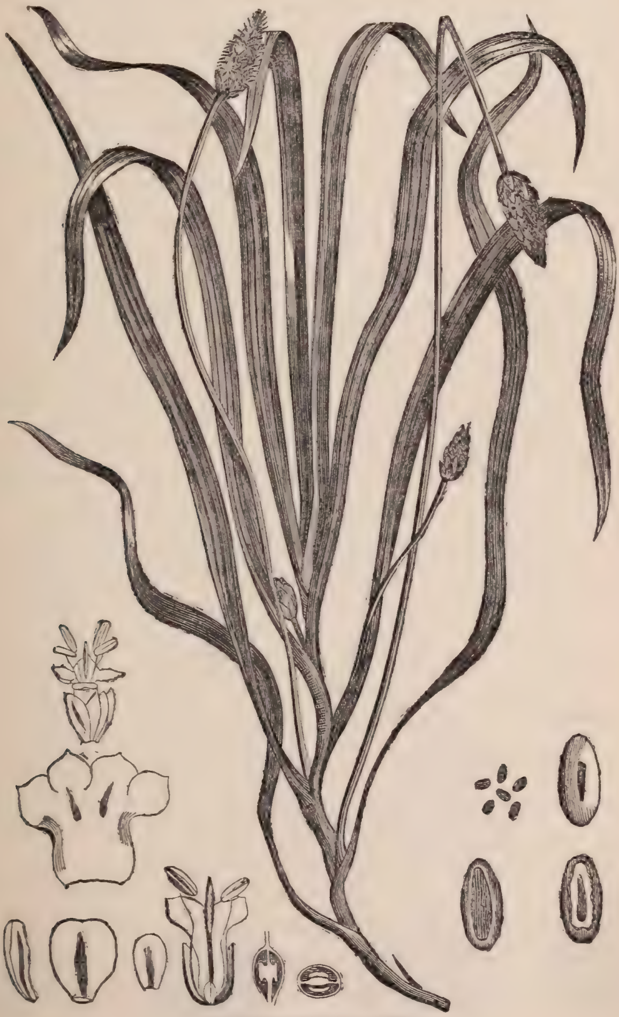
PLANTAGINEÆ.

Ispaghul—(Spogel; Plantago decumbens, Forsk.; P. Ispaghala, Roxb.).—A description of this interesting plant, together with an illustration (Fig. 51), is given in New Rem. (March, 1878, p. 68). The plant occurs in the Canary Islands, Egypt, Arabia, Beloochistan, Afghanistan, and Northwestern India, particularly in the Punjaub and the Pesháwur valley, and it is valued for its seeds, which are officinal in the Indian Pharm. These are boat-shaped in form, being concave on one side, and convex on the other; about the eighth of an inch in length, and about half as broad; and very light in weight, so that, according to Flückiger and Hanbury, one hundred seeds scarcely weigh three grains. They have a grayish color, tinged with pink, and are marked on the convex surface by a lengthened brownish-yellow spot. They have neither odor nor taste, but when chewed they are mucilaginous, and yield to water mucilage in such abundance, that with twenty times their weight of the latter a thick jelly is formed. The mucilage appears not to be affected by borax, alcohol, or ferric chloride. The seeds appear to be free of starch, and they also appear to contain a fat oil and albuminous matter. They have long been highly valued in India and other parts of the East for their cooling and demulcent properties, being used in gonorrhœa, catarrh, and renal affections; but their chief use, according to Warring and others, is in diarrhœa and dysentery.

OROBANCHEACEÆ.

Orobanche Grandiflora and Caryophyllacea.—Prof. X. Landerer states that orobanche is one of the greatest nuisances the Greeks and the Eastern people generally have to contend with, since it is a parasite and eventually destroys leguminous plants, which, particularly beans, form the staple food of these people. The

FIG. 51.



Plantago Ispaghala, *Roxb.*

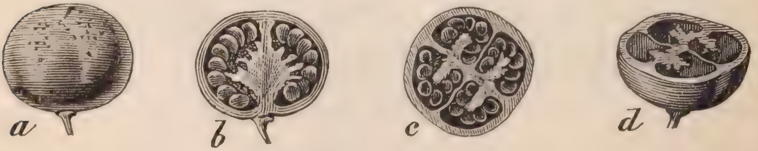
ancients called all leguminous fruits *kymos* or *orobos*, and a temple was dedicated to Apollo Kyametes. The name orobanche is derived from *orobos* (leguminous fruit), and *anchein* (to choke); English, *broom-rope*. A. J. Ph., April, 1878, p. 175.

SOLANACEÆ.

Solanum Paniculatum, Lin.—Chemical Examination of the Berries.—Francis V. Greene, M.D., has had opportunity to subject the berries of this Brazilian plant, together with syrup, wine, and plaster, to chemical examination. These, together with an extract, were on exhibition in Paris, in 1867, in Rio de Janeiro, in 1875, and at the Centennial Exhibition in Philadelphia, and it is from the last-named exhibit that the author's specimens were obtained. The plant is commonly known in Brazil by the name of *jurubeba*, and is also known as the *juripeba*, *jupeba*, or *jubeba*. In consequence of the excessive bitterness of the juice, and the impossibility of procuring the fresh fruit at all periods of the year, the Brazilian pharmacists have for some years prepared from the berries the above-named preparations, and these appear to enjoy a reputation in obstructions of the abdominal viscera, particularly of the liver, and in vesical catarrh. Both the juices of the leaves and fresh fruit appear to be used in the treatment of these affections, and it is stated that Pison had used the decoction of the root with decided success in the treatment of dropsical affections.

The jurubeba, which is described by Linnæus (Spec. Plant, vol. i, p. 267), by Aublet (Plant. de Guiane, vol. i, p. 216), more fully by De Candolle (Pro. xiii, p. 197), and in the Universal Herbal (ed. 1820, vol. ii, p. 597) of Thomas Green, under the name of *panicled nightshade*, is a plant with a fruticose and prickly stem; leaves, according to the variety, of which there are two, either cordate sinuate, or lobed or incised; flowers terminal, disposed in panicles, and fruit, a four-celled spherical berry, each cell containing from twelve to fifteen small flattened seeds of a light-brown color, imbedded in a semi-transparent juicy pulp; pericarp thin, and of an olive-green color.

FIG. 52.



Solanum paniculatum.

a. Berry of the jurubeba plant (Solanum paniculatum, L.) natural size.

b. Vertical section.

c. Transverse section, with seeds *in situ.*

d. Same, with seeds removed, showing membranous character of the dissepiments.

According to Chernovix (Formulario, 9th ed., p. 508), all parts of the plant contain mucilage and a bitter principle. The plant grows in the vicinity of Bahia, at Cape Frio, in the province of Pernambuco, Ceara, Minas Geraes, Santa Catharine, and in other parts of Eastern Brazil. It flowers in December.

The term *jurupeba*, by which the Solanum paniculatum is known in some parts of Brazil, has by Pison (Brazil, 85) also been applied to the *Solanum toxicarium*, growing in Guiana, and used by the natives as a poison. The same term—*jurupeba*—is also applied by botanists to a large number of solanaceous plants, but these are by De Candolle placed in the sub-section Euleptostemonium, whilst S. paniculatum appears among the Tovaria. Furthermore, *jurubeba* or *jubeba* must not be confounded with another Brazilian plant, the *jumbeba*, which belongs to the Cactaceæ. For the purpose of determining whether the berries and the preparations made therefrom contained solania or other alkaloid, Dr. Greene has examined the different articles at his command. By a series of careful experiments, which need not be repeated here, he has proved to his satisfaction that the berries as well as the preparations contained a bitter alkaloidal principle, which is distinct from solania, as well as the known alkaloids of the Solanaceæ, and he, therefore proposes to name the new alkaloid *jurubebia*. The quantity of material was insufficient for the isolation of the active principles or its salts, in a sufficiently pure state to determine either their precise chemical character, or to investigate their physiological action and therapeutic effects. An examination of the ash of jurubeba berries proved that it was composed mainly of lime and magnesia, in combination with carbonic and phosphoric acids. A. J. Ph., Oct. 1877, p. 506.

Belladonna, Hemlock, and Henbane—Cultivation at Hitchin.—E. M. Holmes contributes the following: About eight acres of *belladonna* are grown at Hitchin, from which extract is made on the spot. The plants are raised from seed, and being perennial are grown on the same ground from seven to ten years, when they are replaced by fresh ones. The crop is not cut until the middle of June of the second year, and again at the end of September. The plants usually attain a height of rather more than two feet, but if heavily manured will grow much larger. It is found, however, that in plants which show large leaves, and grow rapidly the medicinal proportions are less powerful in proportion, even the odor of the plant being weaker. This is somewhat analogous to what is known of the cinchona trees, in which as a rule, the smaller the leaves the larger the yield of alkaloid. One cwt. of the herb will yield about 5 lbs. of the extract.

Hemlock is cultivated very sparingly, the wild plant being preferred. It is said to be plentiful in the neighborhood, nearly twenty tons of it being sometimes made into extract by Mr. Ransom; one cwt. of the herb yielding 4 to 6 lbs. of the extract.

Henbane, about 5 or 6 acres (of the biennial plant) are grown on the average; but the quantity varies very much, being almost a total failure in some years. Mr. Ransom's experience corresponds with that of Mr. Usher of Banbury (see Proceedings, 1877, p. 136), as regards the uncertainty attending the appearance of the plant from the seed. Indeed, in one of the fields at Hitchin, in which lavender plants, two years old, were in blossom at the time of the author's visit, only the biennial henbane had come up, which had been sown before the lavender was planted there. Ph. J. Trans., Oct. 20th, 1877, p. 302.

Duboisia Myoporoides.—E. M. Holmes, having received a herbarium specimen of this Australian plant, takes the opportunity to describe it. The duboisia is a small tree or tall shrub, about twenty feet high, with long slender erect branches, arising from the stem at an acute angle, the leaves generally covering only the tops of the branches, so that except at the summit the woody portion of the tree is rather bare. The leaves are alternate, shortly stalked, quite smooth, and entire lanceolate in shape, from three to four inches long, and about one inch broad in the middle. The flowers, which are pale lilac or white, and very small, are arranged in terminal panicled cymes. The corolla is regular, bell-shaped, erect, and only two lines long. The stamens are didynamous, with the rudiment of a fifth one, and the fruit is small, succulent, and berry-like. This description would show the plant to be very nearly allied to the *Scrophulariaceæ*, on account of its didynamous stamens, while in the regular corolla it approaches to the *Solanaceæ*, among which it is now, in fact, placed. The plant is interesting on account of its properties, which approach very nearly to those of belladonna. An extract (of the leaves?) appears to be almost equal to atropia in strength, and is now used instead of that alkaloid both at Brisbane and Sydney. While there is every probability that the plant contains an alkaloid similar to if not identical with atropia the active principle has never been isolated. It is, therefore, important that a chemical examination of the plant should be made, since the plant exists in tolerable abundance and evidently contains an active principle closely allied to atropia, which can be obtained more economically than that of belladonna. Ph. J. Trans., March 9th, 1878, p. 705.

This examination—at least preliminary—has since been made by A. W. Gerrard. The aqueous extract was thinned by an equal volume of water and then treated with alcohol until no further precipitation occurred; the alcoholic solution was filtered and the insoluble matter washed with alcohol; the alcohol was now distilled off, the residual extract diluted with a small portion of water, treated with ammonia in slight excess, and shaken with chloroform; the chloroform separated and distilled yielded a varnish-like residue having a powerful alkaline reaction. By resolution in dilute sulphuric acid and addition of ammonia a dull gray precipitate was produced, immediately aggregating into oil-like drops heavier than the mother-liquid. The alkaloid was finally abstracted with ether, which yielded 21 grains from 1000 grains of extract. The alkaloid appeared as a yellow viscous mass, freely soluble in alcohol, chloroform, ether, benzol, and bisulphide of carbon, fairly soluble in water, and imparting to it a decided alkaline reaction. Crystals were not obtained from any of the solution of the duboisia alkaloid. Its sulphate and hydrobromate appear to be crystallizable. The solution of its sulphate gave reactions which are very closely like those of the corresponding atropia salt. Nevertheless the author does not believe it to be atropia, for the following reasons:

1st. Its solubility in water is twice or more than twice that of atropia.

2d. It has more power in neutralizing acids than atropia.

3d. Its behavior to sulphuric acid in the cold and also when heated with bichromate of potassium, differs from the behavior of atropia.

4th. When boiled with baryta the odor it evolves is entirely different from that given off by atropia under the same conditions.

The physiological examinations of the duboisia alkaloid were undertaken by Dr. Sydney Ringer and Mr. Munel, who have obtained results which agree completely with those of atropia.

Dr. Paul, to whom the author has submitted a quantity of the new alkaloid, has undertaken its further examination. Until his investigations are complete the author prefers to allow the alkaloid to remain without a name. Ibid., April 6th, 1878, p. 781–789.

A. Pettit has also obtained the alkaloid of duboisia from the extract, by a method differing from Mr. Gerrard's method only in the application of bicarbonate of potassium for liberation of the alkaloid and its extraction by ether. The crude alkaloid was repeatedly liberated with bicarbonate of potassium from its solution in diluted sulphuric acid, shaking with ether, etc., and was finally obtained pure by crystallizing its sulphate from absolute alcohol. The crystals of sulphate soon deliquesce and form a syrupy mass. The chief distinguishing characters of this alkaloid from atropia are its greater solubility in water, and the property of its solutions to deflect polarized light to the left. Physiological experiments made by Drs. Galezowski and V. Wecker substantially confirm the experience of the English physicians. Zeitschr. Œst. Apoth. Ver., June 10th, 1878, p. 270.

OLEACEÆ.

Olives.—Prof. X. Landerer states that olives of the unusually large size, 2 to 2½ inches in diameter, are occasionally met with in Greece. The trees, which bear only few fruits, are said to have come from the island of Rhodes.

Of late the Greeks have introduced the use of bisulphide of carbon for extracting all the oil from olives after they have been expressed. Oil extracted by this means is called *pyrenelaion*, from *pyren*, a kernel.

The author also refers to the successful application of an extract of olive leaves and immature fruit, prepared with diluted sulphuric acid, in the treatment of fevers. A. J. Ph., April, 1878, p. 177.

LABIATÆ.

Cultivation of Lavender at Hitchin.—E. M. Holmes contributes an interesting paper on the cultivation of medicinal plants at Hitchin. The plant which is most extensively grown at Hitchin is the lavender (*Lavandula vera*, D.C.). The crop at present grown is much affected by the presence of a disease which attacks the plants just as they are beginning to flower, and causes them to wither away by degrees. This disease occurs not only at Hitchin, but also at Mitcham, where, indeed, it was observed first, and in other localities. To such an extent has this disease occurred at Market Deeping, in Lincolnshire, that Mr. Holland, who formerly cultivated lavender there, has now ceased to cultivate it. After a more particular description of the disease and some speculations on its probable cause, the author proceeds to describe its cultivation, as carried on by Mr. Parks and Mr. Ransom, of Hitchin. The harvest of lavender flowers is rarely over until the middle of September, so that it is not possible to get the ground cleared and ready for the fresh plants before the end of October or beginning of November. The ground is generally manured beforehand with 30 to 45 tons of stable manure per acre, but manure is not applied afterwards until a fresh planting takes place. The roots of the old plants are parted sometimes from two, but preferably from one year old plants, and the sets dibbled in rows about 18 inches apart. The young plants make a start in growth in March, if the weather be mild with gentle showers, and increase considerably in size in April and May, so that the tufts become on an average about a foot in diameter. If, however, there occur heavy rains, so that the leaves are much splashed with soil, the growth is somewhat retarded. In hollows, or where the damp is likely to remain, the young flowering stems, if there be frost in May, are frequently nipped and the plant either dies or does not send up fresh flower-stalks until the end of June, making the harvest a late one. Black frosts do not, however, injure the plants. The sets, if made by parting the roots, flower the first year. If, however, slips from branches are taken, they are not allowed to flower the first year lest the young plants should be weakened thereby, but the flower shoots are clipped down close to the stem. In the second year every alternate plant is removed in autumn and planted elsewhere, leaving the others one yard apart. The second year the plants attain a diameter of about 15 to 18 inches, and in the third year from 2 to 2½ feet. Shade has a pernicious effect upon the plants. Under the shadow of trees they become starved and produce scarcely any flowers. The growth of other plants between the rows also injures the crop. Weeds, too, have to be kept down. The plants grow best and produce most when they have plenty of room and sunshine. The weather has considerable influence on the yield of essential oil. If the days are bright and sunny, during June and July, the yield will be a very good one. If wet and dull, very often not half the average. A 200 gallon still will, according to Mr. Parks, yield about $1\frac{1}{4}$ lbs. of essential oil in a good season, but in a bad one, barely 12 ounces. The time of gathering the flowers also modifies the yield, which is poor if they are gathered after the first week in September, and best when gathered about the middle of August. The harvest usually begins about the first week in August. The flower-stocks of one plant are grasped, as far as may be, with one hand and a sickle is used with the other. They are (by Mr. Ransom) then packed in eight-bushel sacks and carried direct to the still, about 14 sacks going to a 1000 gallon still; or they are tied up in bundles, weighing about 22 lbs., and as much as possible of the stalks afterwards cut off and the still then filled up with flowers. The distillation is commenced at 4 or 5 o'clock in the morning, and the still is filled four times a day, the men leaving work at 10 P.M. The water which comes off with the oil during the first hour, being slightly impregnated with oil, is returned to the still, but that which comes over afterwards is allowed to run away. The oil which comes over after the first hour and a half is either redistilled or sold as inferior quality. The refuse, when removed from the still, is thrown into heaps, and when decayed is returned to the lavender fields. In a good year the lavender yields from 4 to 6 Winchester quarts (each about 5 lbs. avoirdupois) of essential oil per acre, about 53 acres being under cultivation. The oil improves by keeping up to three years, after which it begins to deteriorate unless mixed with spirit. Redistillation also improves its quality, but is not profitable unless steam heat is employed, the loss being about 1 lb. per gallon. The stems are never distilled, as the oil obtained from them is of inferior quality and in small quantity. Ph. J. Trans., Oct. 20th, 1877, p. 301.

BORRAGINEÆ.

Heliotropium Europæum.—Bettandier has obtained from this plant an alkaloid, *heliotropia*, by the following method: 10 kilos. heliotrope were boiled with acidulated water, the decoction was evaporated to syrup thickness and precipitated with strong alcohol to separate most of the extractive matters. The alcohol was distilled from the filtrate, the residual extract treated with potassa and ether, the handsome green ethereal solution was shaken with 50 cc. of water acidulated with sulphuric acid, and this aqueous solution was again treated with potassa and ether. The ethereal solution on evaporation left an oily residue, which gradually solidified, forming a mass in which the microscope revealed crystalline prisms belonging to the klinorhombic system.

Heliotropia is white, readily turns yellow, has a taste almost as bitter as quinia, and is readily soluble in water. With sulphuric and hydrochloric acid it forms amorphous salt, which in doses of 25 milligrams produced death in dogs and cats. The saline aqueous solution turns black. Its solutions afford precipitates with tannin, potassio-mercuric iodide, potassio-bismuth iodide, iodide of potassium in tincture of iodine, picric acid, and the alkalies. No precipitates are produced by platinous chloride, mercuric chloride, strong acid, or bichromate of potassium; but the latter, in sulphuric acid, becomes deep green. Bromine forms a resinous, light-yellow, tough mass, floating on the surface of the liquid, and affords a delicate and characteristic reaction. Arch. Ph., Jan. 1878, p. 80; from Rép. de. Ph.

CONVOLVULACEÆ.

Convolvulus Scammonia.—The statement having been made that convolvulin, from the roots of *Convolvulus scammonia*, has an alkaloidal character, Chas. T. Kingzett and Thomas Farries have investigated the subject, and find, as a result of careful experiments, that convolvulin is *not* alkaloidal in its character, but that it is a glucoside, differing little from jalapin, either in its chemical characters or in its composition. Jalapin and convolvulin (or jalapin from scammony resin) have identical compositions, and viz., $C_{34}H_{56}O_{16}$, according to various authors; but the first is split up into jalapinol and glucose, 2 mol. of jalapin forming when boiled with dilute acids, under the assimilation of 11 mol. of water, 1 mol. of jalapinol, and 6 mol. of glucose; while 1 mol. of jalapin from scammony resin is by the same action, and with the assimilation of 5 mol. of water, split up into 1 mol. of jalapinolic acid and 3 mol. of glucose. Yearbook of Ph., 1877, p. 595.

Scammony.—C. Goværtz has examined several lots of scammony of the market, and finds a good deal of it to be inferior or adulterated. Three samples yielded the following results:

	Aleppo S. (good).	Ordinary S.	So-called Aleppo S.
Resin, ...	85	20	8
Gum, ...	4	10	3
Starch, ...	0	63	75
Mineral matters, . .	11	7	14
	100	100	100

New Rem., June, 1878, p. 175; from J. de Ph. d'Anvers, April, 1878.

Jalap—Cultivation in Jamaica.—According to the last report on the Jamaica Botanic Gardens it seems that nearly two acres of land attached to the cinchona plantation is now systematically cropped with jalap, the crops during the past year amounting to 1700 ℔s., and it was estimated (about the middle of February, 1876), that at least 3000 ℔s. additional would be obtained in the course of a few months, and would be sent to England. Ph. J. Trans., July 7th, 1877, p. 6.

APOCYNACEÆ.

False Angustura Bark.—The question having been raised at a meeting of the Pharmaceutical Society of Great Britain (February, 1877), whether false angustura bark contained strychnia, W. A. Shenstone undertook the investigation of the subject, using for his experiments some bark, the greater part of which had been consumed in an unsuccessful attempt to prepare *pure* brucia. Operating by a modification of the method employed by Pelletier and Caventou, in the research by which they discovered brucia, he did obtain strychnia, although only in small quantity. By the failure of Pelletier and Caventou to extract strychnia from the bark, Watts, and other authorities, have doubtless been induced to state its absence in false angustura bark. The modification of the method adopted by the author is as follows: Three and a half ounces of the bark were exhausted by roughly powdering and repeated by boiling with fresh portions of rectified spirit; the alcoholic decoctions were united, the spirit distilled off, the residue diluted in water, evaporated to a small bulk to remove the last traces of spirit, again diluted, warmed, and, after cooling, filtered; the filtrate was treated with excess of subacetate of lead to precipitate coloring matter, which was filtered off, and lead removed from the filtrate by accrument of sulphuretted hydrogen; after boiling to expel excess of gas, the liquid was boiled with magnesia, filtered, and the residual magnesia well washed with boiling water, the washings being added to the filtrate, which was now evaporated to dryness, the residue of evaporation dissolved in acidulated water, and the acid solution, rendered alkaline by ammonia, was repeatedly washed by ether; the ethereal solutions were combined, distilled, the residue treated for some hours with sulphuric acid on a water-bath, then diluted, and after addition of excess of ammonia again extracted by agitation with ether; this ether on evaporation yielded a residue, which though not colorless gave ample indications of consisting largely of strychnia. The impurities appear to be a trace of brucia, and a resinous body, difficult of destruction, which at first prevented the strychnia from crystallizing, although the author afterwards succeeded in obtaining the hydrochlorate in crystalline form. A better acquaintance, at the time, with the nitric acid method for removing brucia (which see, under alkaloids, in this report) might have induced the author to apply it to the removal of the impurities; but under the circumstances he considered it safer to apply the method of purification by ether, although it is less delicate.

Since the *brucia*, whose physiological action was examined by Pelletier and Caventou, was prepared from this source, and, therefore, probably contained strychnia, and, in view of the results of the author's examinations of commercial brucia (which see), he considers it very doubtful if the physiological effects of *pure brucia* have ever been studied, and induces him to think it not impossible that the strong resemblance of its action to that of strychnia may even be due to the proportion of strychnia which it contains. Ph. J. Trans., Dec. 8th, 1878, p. 446.

Hoang-Nan, a Chinese Remedy for Hydrophobia.—Under the name of "Hoang-nan" the missionaries of Tong-King have recommended a bark as an excellent remedy in mania and leprosy. Planchon, who has secured samples of this bark, has found it to correspond with false angustura bark, which, as is now well known, is the bark of the same tree that yields the nux vomica. The missionaries further remark, that the rust-colored dust adhering to the bark is the part used, that this—containing a subtle poison—is the active constituent, and that the ligneous portion of the bark is inert. This statement is remarkable, since all older analyses of false angustura bark prove, that the poison (strychnia and brucia) are not contained in the corky layer, but in the more solid under layer of the bark. Zeitschr. Œst., Ap. Ver., July 10th, 1877, p. 330.

Curara.—J. Moss, in view of the circumstance that curara has been proposed as a remedy for hydrophobia, communicates some interesting information in reference to its history, source, preparation, character, and uses. It is the arrow-poison used by all the South American savages between the Amazon and Orinoco, and according to most authorities it is made by the Macoushi Indians, although the Acaaway tribe is also mentioned. It is known by the synonyms, *Ourari*, *Urari*, *Wourari*, *Wourali*, *Wouraly*. Perhaps the first account of the wourali poison is given by Waterton in his "Wanderings in South America," who obtained a quantity of the poison from the Macoushi Indians. He does not seem to have made any inquiry respecting the plant yielding the principal ingredient, or to have obtained a specimen of it, but describes the process of its preparation, which is briefly this: Thin scrapings of the wourari vine and of a bitter root are percolated with water in a crude fashion into an earthen pot, and into the percolate the green and glutinous juice of two kinds of bulbous plants is squeezed with the hands; two kinds of ants, the one large and black, the other small and red, are bruised up with the fangs of two kinds of snakes, and a quantity of the strongest Indian pepper, and all is thrown into the pot, which is then placed over a fire, and the contents boiled down to a thick syrup of a deep-brown color. If on trial it is found to be satisfactory, the syrup is poured into a calabash, and carefully covered with leaves and deerskin, and set aside in a dry place. Dr. Hancock, who resided for many years in British Guiana, received two accounts from different Indians, which well agree with each other. They call the plant *mavacuri*, and say it is of the gourd kind, or one of the *Cucurbitaceæ*, of the size of a large orange, round, and having a hard shell or pericarp, which is used at times to contain poison. The poison is made from the bark, which is peeled or scraped off by bruising it well in a mortar, transferring the mass to a funnel or cartocho made of wild plantain leaves, having a little cotton at the bottom to strain it through, and then lixiviate the mass with cold water; the infusion is boiled down to the proper consistence in an earthen pot, nothing further being added, according to either account. Mr. J. Forsyth, however, informed Dr. Hancock that besides the wourari vine the inner bark or rind of the root of which is used only, and a small branch of which accompanied the information, two other vines, called *wooray bally* and *courampoey*, are used as auxiliaries to strengthen* the former. The wooray bally root undergoes the same process as the wourari, but it is the vine itself of the courampoey that is used; finally, some peppers are added, and the whole well boiled down to a thick syrup. In 1837 Dr. Hancock added to his previous statements, that in the preparation of the poisons by the Macoushis, the slimy barks of the *kyheri* and *quasima* are added, to give tenacity to the extract. He also remarks that "the most efficient poison is prepared from the wourari vine alone." It seems, therefore, probable that the *modus opérandi* of the savage varies with the material at his command in the changing seasons of the year. The wourari vine now seems to be generally accepted to belong to the *Strychnos* family, *Strychnos toxifera* being more particularly mentioned. As to the description of the poison, it does not always tally. Waterton describes it as "a thick syrup of a deep-brown color." In 1838 he says, "On opening the wax in which it is inclosed, I found it quite soft and ready for use, although it had not been looked at for twenty years." Forsyth says, "The Indians boil the whole mass to a thick syrup." Wormley, Watts, and Taylor agree in their description, according to which it is a brownish-black, shining, resinous mass, almost wholly soluble in water, either cold or warm, easily soluble in aqueous alcohol, partly soluble in ether, sparingly soluble in absolute alcohol, bitter to the taste, neutral in reaction; and their description applies to the curara, which is at present found in commerce. After reviewing the physiological properties and antidotes, and the views as to the nature of the active principle, "curara," etc., the author proceeds to give the result of his microscopical examination. A minute fragment of curara, corresponding to the description above given, was placed in a drop of alcohol on a slide, and well crushed by pressure on the cover. The central mass of curara was seen to be of a rich brown color, and copiously studded with quadrilateral crystals. Outside this were numerous isolated crystals of the same shape, from which the cementing material had been dissolved by the alcohol, leaving them colorless. Scattered with tolerable evenness over the field were myriads of dusty particles, having a faint tinge of yellow, and moving freely when the slide was rotated. The particles were subsequently found to be oxide of calcium; the crystals were taken to be curaria; the cementing material was apparently amorphous. The results of some additional experiments are such as to favor the opinion that curara as now met with is an aqueous extract of a bark, root, or stem.

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* This word "strengthen" probably applies to "giving the finished curara adhesiveness or consistence."

Regarding the medicinal exhibition of curara, the author states that its properties preclude its use in any other form than that of a solution for hypodermic injection. The preponderating evidence relative to the stability of curara in aqueous solution being favorable, the author recommends a hypodermic solution prepared by dissolving 1 grain of curara in 12 minims of water.

Finally, the author CAUTIONS against the careless handling of this poison. It should not be allowed to come in contact with a fresh cut or scratch. Two good rules would be, never to powder it in the dry condition, and never to touch it with the naked fingers. Ph. J. Trans., Dec. 1st, 1877, p. 421.

Dr. Jobert gives the following description of the preparation of curara by the Tecuna Indians at Caldera (Brazil), near the Peruvian frontier. The principal elements of the preparation are: 1. *Urari uva*, a climbing plant (*Strychnos Castelnæ* of Weddell?); 2. *Eko* or *Paris du maharão*, a climbing plant, having the characteristics of the Menispermaceæ (*Cocculus toxiferus* of Weddell?); 3. *Taja*, a plant belonging to the Arum family; 4. *Eoné* or *Mucura-ea-ha* (*Didelphis cancrivora?*) which has the appearance of an amaranth; 5. *Three Piperaceæ* (of the genus *Artanthe?*); 6. *Tan-ma-gere* or *toucan's tongue.* These plants have all been photographed by Dr. Jobert, who also brought specimens of them. The poison is prepared as follows: The first bark from the branches of the *urari* and *eko* is scraped very fine, and mixed in the proportion of 4 parts of the former to 1 part of the latter. This mixture is rubbed up in the hands and then placed in a palm-leaf funnel, and exhausted with cold water, which is run through it seven or eight times, until it becomes red. This liquid is then boiled with fragments of the stems of the *taja* and *mucura* for six hours, or until it thickens, after which the scrapings of the *Piperaceæ* are added, and it is again boiled. When it cools, it has the consistence of thick blacking. Dr. Jobert experimented with each of the constituents of the preparation separately, and found that the *urari* and *taja* were the most active. New Rem., April, 1878, p. 113; from Bull. de Thérap., Feb. 1878.

Pao-Pereira (*Geissospermum Læve, Baillon.*)—The bark of the pao-pereira tree is known to contain an alkaloid, named by its discoverer (Santos, in 1838) *pereirine*, and M. M. Bochefontaine and De Freitas have now also determined the existence of this alkaloid in the leaves of the plant. The tree is a native of Brazil, and its bark has been much used by the physicians of that country, since Prof. Silva, about the year 1830, made known its febrifuge and antiperiodic properties. The plant has been variously designated as *Picramnia ciliata*, *Vallesia punctata*, *Tabernæmontana lævis*, and *Geissospermum Vellosii.* Prof. Baillon is, however, of the opinion, after a recent examination of leaves and stems received from Brazil, that it should bear the name of *Geissospermum læve.*

The alkaloid, which the authors propose to call "*geissospermia*," after the generic name of the plant, instead of "pereirine," as named by its discoverer, is employed medicinally in Brazil, although not in a chemically pure condition; it there occurs in form of a brownish-yellow amorphous powder, the bitterness of which resembles that of the leaves and bark, which, in its turn, is analogous to that of *Quassia amara.* Although daily employed in Brazil for many years past the physiological action of neither the alkaloid nor bark appears to have been studied. The authors therefore took up the investigation, using the alkaloid dissolved in water or alcohol, and alcoholic and aqueous extracts of the bark, and have arrived at the conclusion that it is a toxic substance, exercising no local irritant action when administered subcutaneously, and that it acts by destroying the physiological properties of the central nervous gray matter. Ph. J. Trans., Sept. 8th, 1877, p. 182. From Compt. Rend.

Referring to the experiments of Bochefontaine and De Freitas, O. Hesse communicates the fact that he has also been engaged in the investigation of this subject, and that in June (1877?), he had informed Professor Wiggers, to whom he was indebted for a considerable quantity of bark and leaves of pao-pereira, that the bark contained several alkaloids, one of which was distinguished from the other by its difficult solubility in ether. This alkaloid he had named "geissospermia."

Geissospermia forms small white prisms, truncated at both ends. It dissolves readily in alcohol, but is nearly insoluble in water and in ether. It is freely soluble in dilute acids, and from such solutions it is again precipitated by an excess of ammonia or sodium hydrate. The precipitate at first consists of amorphous white flocks, which are quickly transformed into small crystals. The hydrochloric solution gives with platinic chloride a pale-yellow amorphous precipitate; with chloride of gold it gives a brown-yellow precipitate, no reduction of the metal taking place in this case. Nitric acid dissolves geissospermia with a purple-red color, which continues for a considerable time at the ordinary temperature, but on heating immediately changes into orange-yellow. Pure conc. sulphuric acid dissolves the alkaloid colorless; but after a few seconds the solution becomes bluish, afterwards blue, and at last again pale. Ordinary concentrated sulphuric acid, or acid containing oxide of iron, dissolves the alkaloid with a more or less intense blue color, which eventually becomes pale. Sulphuric acid containing molybdic acid, on the other hand, dissolves it with a dark-blue color, which retains the same intensity as at first, even after twenty-four hours. Conc. hydrochloric acid produces no color reaction. When heated with soda lime, the alkaloid yields a substance that sublimes in light-yellow delicate scales, which are freely soluble in ether, and dissolves without color in conc. nitric acid, but with a beautiful blue color in sulphuric acid containing molybdic acid.

The crystalline geissospermia contains water of crystallization, which passes off at 100° C. (= 212° F.), the substance becoming faint yellow. At a higher temperature it becomes more colored and melts at 160° C. (= 320° F.), forming a brown liquid that solidifies amorphous on cooling. The formula for anhydrous geissospermia is $C_{19}H_{24}N_2O_2$; the hydrate or the crystalline air-dried alkaloid contains in addition one molecule H_2O ($O = 16$).

A second alkaloid of pereira bark forms a grayish-white amorphous powder, very easily soluble in ether. It is colored blood-red by concentrated nitric acid, and violet-red by pure sulphuric acid. It corresponds best with the notices of Goos and others respecting *pereirina*, which name should, therefore, be retained for it. It is apparently contained in the bark in preponderating proportions. The author promises to continue his investigations on both of these alkaloids, and especially to ascertain whether they are contained in the leaves of pao-pereira, which Wiggers has received from Rio Janeiro, under the name *Folia Carobæ*. Ph. J. Trans., Feb. 16th, 1878, p. 648.

Echites Suberecta.—Bowrey, appointed by the government of Jamaica to investigate the vegetable poisons of the island, has examined, among others, *Echites erecta*, and has obtained from it a powerful poisonous alkaloid, the one-thousandth part of a grain of which is capable of poisoning a cat.

The operation was a very unpleasant one, in consequence of the pain caused when small particles of the substance came in contact with the skin. Ph. J. Trans., July 7th, 1877, p. 5.

SAPOTACEÆ.

Indian Species of Bassia.—J. R. Jackson draws attention to three species of Bassia, well known in India: *Bassia butyracea*, Roxb., *B. longifolia*, Willd., and *B. latifolia.* Of these, it is especially the latter that is of importance, since its flowers are used extensively as food and for the distillation of ardent spirit.

Bassia butyracea is known as the Indian butter-tree or "Phulwa," and grows to a height of from forty to fifty feet, with a straight trunk, five or six feet in circumference. From the seeds, by beating to a creamy mass and expressing, a soft but solid white fat, of the consistence of fine lard, is extracted, which may be kept for a long time without becoming rancid, and serves a variety of purposes, having the reputation of being a valuable preservative for the hair, as a remedy for rheumatic affections, and being used for illuminating purposes and in the preparation of soap. The oil cake is eaten as food. The pulp of the fruit is sweet and insipid, but is eaten by the people. The flowers abound in a sweetish juice, which is sometimes made into sugar and sold in the bazars; the flowers are not eaten.

Bassia longifolia, known as "Illupi," grows to the height of some forty feet, and is common in the forests of Western Mysore, Malabar, and the Circars. The seeds yield an inferior oil, which soon becomes rancid and disagreeable. The oil-cake is used for preparing a head-wash. The bark is used as an astringent and emollient in form of decoction, and it yields a viscid, gummy exudation, as do also the leaves, which formerly enjoyed a reputation in rheumatic affections. The flowers are roasted and eaten, and are also bruised and boiled till they form a jelly.

Bassia latifolia, commonly known as the "Mahwa" tree, abounds in all parts of Central India, from Guzerat to Behar; in the Punjab it is grown in the sub-Himalayan tract and the outer valleys as far as Ravi, but not commonly in the plains; it appears, doubtless, that the tree is indigenous in the forests of the Saptura range of Western India, above Ghat, and perhaps, also, of Eastern Kumaon. It thrives in dry, stony ground. The old leaves are shed gradually from February to April, the fresh leaves opening out immediately afterwards. The seeds abound in a greenish oil, which is quite fluid, keeps well in a cool climate, but in the hot climate of India soon turns rancid, assuming a bitterish taste and a brown color, and a heavy oil separating from the fluid portion. The oil-cake is used for poisoning fish and as an emetic. The fruit is eaten both in the ripe and unripe state. But by far the most important are the flowers, which appear before the new leaves, in March and April. These are quite fleshy or succulent, and fall from the trees in vast quantities during the night, a single tree affording from 200 to 400 pounds of flowers during a season. They are eaten in very large quantities, both raw and cooked, sometimes with grain and sometimes with sweetmeats, and great quantities appear to be dried and stored by the forest or Bheel population as a staple article of food. They have a sickly, sweetish taste, and a sweet, somewhat spirituous smell, more especially after having been in a box or close jar. In Guzerat and Rajpootana every village has its spirit shop for the sale of the distilled liquor from the flowers, the distillation being carried on chiefly by Parsees. The spirit, when carefully distilled, is much like good Irish whisky, having a strong, smoky, and rather fetid flavor; this latter disappears by age. The fresh spirit is, owing to the quantity of aromatic or empyreumatic oil it contains, very deleterious. Experiments appear to have been made in England quite recently with a view to the more extended utilization of these flowers for the production of spirit and as food for cattle. For the latter purpose it appears to be well adapted; as regards the former, it was found that 6.16 gallons of proof spirit could be obtained per cent. of flowers. It is, therefore, probable that mahwa flowers may ere long become a recognized article of (British) commerce. Ph. J. Trans., Feb. 16th, 1878, p. 646.

Balata, a new Substance resembling Gutta-percha.—Under this name a substance has lately been introduced into the European markets as a substitute for gutta-percha, with which it not only possesses many properties in common, but is in some respects superior, although inferior to caoutchouc. It is a product of the milky exudation of a tree, growing on the shores of the Orinoco and Amazon rivers, called the "Bully-tree." Each tree yields, by careful methods of collection, similar to those now employed for the collection of caoutchouc and gutta-percha, ⅓ to ½ kilogram of balata annually. It becomes soft at 50° C (= 122° F.), and melts at 150° C (= 302° F.). It is evidently a mixture of various resins, since it is partly soluble in absolute alcohol and anhydrous ether, soluble in oil of turpentine only by the aid of heat, but completely soluble in benzol and bisulphide of carbon, even in the cold. It becomes strongly electric by friction, and is a better isolator of heat and electricity than gutta-percha. It is not affected by caustic alkalies or by concentrated hydrochloric acid, but is destroyed by concentrated nitric and sulphuric acids. Ph. Cent. H., Nov. 8th, 1877, p. 380.

ERICACEÆ.

Ledum Latifolium, *Ait.*—Prof. J. M. Maisch reports having recognized specimens of a shrubby plant from Michigan, in the northern part of which State the Indians claim for it great healing virtue, to be the above-mentioned species of ledum. It is supposed to possess soporific and cathartic properties, and externally used as a sovereign remedy in fever cases, bruises, and rheumatism. It appears also to be popularly used to some extent in Canada, and considered a valuable medicine; its supposed properties, however, are not mentioned. The plant is known by the name of James Tea and Labrador Tea, and occurs in British North America, and in the United States, from New England to Wisconsin, and southward to the mountains of Pennsylvania, flourishing in cold bogs and damp woods. In Redwood's "Supplement to the Pharmacopœia," it is stated that the leaves are used for tea, and when infused in beer render it unusually heady, producing headache, nausea, and even delirium, but have, nevertheless, been used, it is said, in tertian agues, dysentery, and diarrhœa. This little shrub is similar to the *Ledum palustre*, Lin., which is indigenous to Northern Asia, Eastern and Northern, and some parts of Central Europe, and likewise to British America. *L. latifolium* has been analyzed by Bacon, but the author has not been able to consult his essay. *L. palustre* has been repeatedly examined. The most complete, though now not satisfactory, analysis is by Meissner, who found, besides the more generally distributed principles, notable quantities of tannin, and 1.5 per cent. of volatile oil. Rauchfuss (1796) had previously obtained 3 per cent. of volatile oil. G. W. Grassmann (1831) noticed for the first time the stearopten, which he obtained to the extent of nearly seven-tenths of one per cent. of the weight of the fresh plant, and which L. A. Buchner (1857) subjected to elementary analysis, and found to be a hydrate of a terpene, agreeing with the formula $5C_{10}H_{16},3H_2O$ ($O = 16$). Willigk also examined the volatile oil, and besides the stearopten, determined it to consist mostly of a hydrocarbon of the same composition as oil of turpentine. Grassmann's ledum-camphor volatilizes readily, its vapor producing headache and vertigo. The author considers it not improbable that our indigenous species may contain similar principles, and, aside of the volatile oil, may possess the tonic, somewhat astringent and diuretic properties of the leaves of other Ericaceæ. A. J. Ph., 1878, p. 55.

GENTIANACEÆ.

Gentian Root—Presence of a Tannin-like Matter.—The paper of Prof. Maisch, combating the assertion of Patch, that tannin is present in gentian root (see Proceedings, 1876, p. 135), has given rise to an investigation of *Gentiana Burseri*—which, with *G. lutea*, is found in great abundance in the Pyrenees—by Ville, of the Montpellier School of Pharmacy, which was undertaken with a view to settling the point of dispute. The author states that cold macerations of these gentians gave positive indications of the presence of tannin with perchloride of iron, albumen, and gelatin, and that a small piece of fresh calfskin, placed in a concentrated infusion, also presented very apparent indication of tanning in a month after the commencement of the experiment. Further experiments induced the author to isolate both *gentianin*—the coloring principle—and *gentiopicrin*—the bitter principle, and he finally determined the gentianin to give the reactions resembling those of tannin very decidedly. He considers that there exists considerable analogy in their chemical functions between this coloring matter of gentian and the coloring matters of rhatany and yellow-wood, and he proposes, that in consideration of these properties, "gentianin" should be called *gentio-tannic acid.* Ph. J. Trans., Sept. 8th, 1877, p. 182. See also Amer. Jour. Phar., 1877, p. 429.

LOBELIACEÆ.

Lobelia Inflata.—Wm. H. D. Lewis has prepared and re-examined the proximate principles of *Lobelia inflata.* His observations on the alkaloid will be found elsewhere in this report (see *Lobelina*). The peculiar acid, *Lobelic acid*, which Procter (the author erroneously quotes "Proctor") had mistaken for gallic acid, is, according to the author, best prepared by adding a solution of sulphate of copper to the decoction of the drug as long as a precipitate falls, washing the precipitate on a filter, suspending in water, and passing in sulphuretted hydrogen until the mixture becomes of a uniform deep-brown hue. The solution is then gently heated, the sulphide of copper removed by filtration, the filtrate carefully evaporated, and the lobelic acid extracted from the residue by boiling ether. A yellow crystalline mass of decided acid reaction is obtained on evaporating the ethereal solution, which, when purified by resolution in cold ether and evaporation, is obtained in small acicular crystals. Lobelic acid is soluble in water, alcohol, and ether, and is non-volatile. Its aqueous solutions are precipitated green by sulphate of copper, the precipitate being soluble in acetic acid and the alkalies; ferric chloride produces a brown precipitate, but slightly soluble in acids and alkalies; acetate of lead produces a copious yellow precipitate; nitrate of silver a white precipitate, becomes red-brown on standing; mercuric nitrate gives a dirty white precipitate, and chloride of barium produces no change. These precipitates produce in the decoction of the drug—which is red-brown—darker-colored precipitates than those obtained with the pure acid.

The acrid principle described by Enders under the name of *lobelacrin* ("Pharmacographia," pp. 357–9) the author believes to be simply *lobeliate of lobelina*, with probably an excess of acid; by following the directions given for its preparation, he obtained warty tufts of a brown color, which, while possessing the character claimed for it, gave the reaction both for lobelic acid and lobelina. Regarding the volatile principle of lobelia, the author's experiments correspond with the observation of Procter, that water distilled from it is entirely without the acrid taste of the herb. In the present experiment the aqueous distillate was found to be a light-brown liquid, having the odor of lobelia, somewhat intensified, but nothing that could be said to approach the characteristic taste of the plant. The liquid was turned darker on the addition of sulphuric acid, and also by ferric chloride, is not changed by tannic acid, but produced a yellow precipitate with phosphomolybdic acid, dissolving to a green liquid in ammonia-water, and then changing to yellow on boiling. Reinsch had found the odor of the plant to be due to a volatile oil, having a "bland taste and pungent odor." In 1844, Pereira announced the existence of a volatile acrid principle, called *lobelianin;* an acid (peculiar), resin, gum, etc. Reinsch (1843) mentions a peculiar substance, to which he applied the name *lobeliin*, and which was evidently supposed to be the active principle of the plant. Obtained by the method described in Reinsch's paper, the author found it to be evidently an indefinite compound, containing, perhaps, traces both of lobelina and lobelic acid. The substance isolated by Colhoun as the active principle of the drug, and called by him *lobelin*, has been shown by Procter to be the hydrochlorate of lobelina. The so-called "mucous gum" and "vegetable gluten" of Reinsch, as well as the "resin" mentioned by Pereira, were prepared, but not considered sufficiently important to justify extended investigation. Ph. J. Trans., Jan. 19th, 1878, p. 561.

Chas. S. Plumb points out, in contradiction to the statement in the United States Dispensatory, that Lobelia root is not used in medicine. It is almost inert, and is not found in the market. The general characteristics of the leaves, as given by the authorities, is correct, except the conclusion that lobelia is poisonous. He had taken it in very large doses, and had known it to be prescribed in doses of one-half to two or three drachms, without any injurious effect following, even when the drug had been retained in the stomach. Lobelia, also, has no cathartic properties whatever, but it produces speedy and severe vomiting, attended with continued nausea, copious sweating, and general relaxation, as described in the Dispensatory. A. J. Ph., Dec. 1877, p. 588.

COMPOSITÆ.

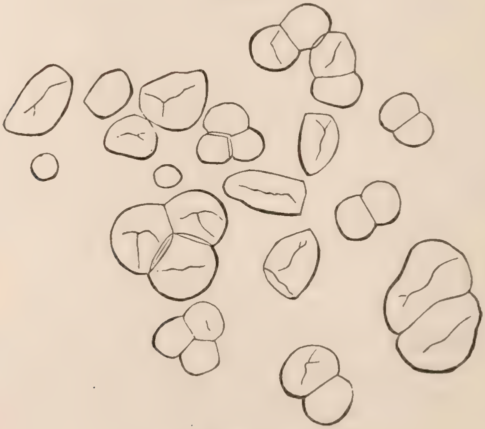
Costus.—M. C. Cooke communicates a lengthy paper on this interesting drug, which is the root of *Aplotaxis auriculata*, D. C. (*Aucklandia costus*, Falc.), a composite plant, inhabiting the Northwestern Himalayas, according to Stewart, at an elevation of from 10,500 to 13,000 feet. This "Kost" or "Costus" has no relation whatever to the plant *Costus speciosus*, Sm., or *Costus Arabicus*, Linn., with which it is sometimes confounded. Dr. Falconer, who was the first to trace the drug to its true source, maintains that the *Aplotaxis* was the Costus of the ancients, and gives plausible reason in support of this view. Surgeon Moodeen Sheriff has determined the following native synonyms: *Qust*, Arab.; *Kosht*, *Kost*, Pers.; *Pachak*, *Kut*, Dukh.; *Goshtam*, Tam.; *Goshtamu*, Tel.; *Koshtam*, Sans. It is the *orris root*, *patchuck*, *putchuck*, or *ooplates*, of the trade-lists and returns, and the *Pachak* of Bengal. In China it is known as *Muh-hiang* and *Kwang-muh-hiang*.

After a profuse account of its history, the author gives the following description of the drug: "The root, as met with in the bazars, consists of irregular pieces, from two to three inches in length and scarcely an inch in diameter, cylindrical, with a rough and somewhat reticulated surface, and very compact and brittle. Internally it is dirty white, with radiating bundles, leaving numerous small cylindrical channels filled with brownish resin. There is no distinct bark or central medulla. When cut or rubbed it has a strong and definite odor, resembling violets or orris root. In taste it is at first camphoraceous and then bitter, with a slight pungency, but by no means unpleasant. The genuine root does not appear to be at all subject to the attack of insects, although fragments of foreign roots introduced as adulterations are nearly all destroyed. Of the two varieties of root, that called *Kut tulkh* is probably the old, and *Kut shirin* the young root. Dr. Stewart hazarded the opinion that *Kut shirin* is the product of a different and unknown plant. Two specimens collected in Kashmir, under the names respectively of *Tet Khot* and *Muder Khot*, do not appear to differ except in size."

Regarding its composition, no record of any chemical examination appears to exist. The author has determined it, by microscopical examination, to contain very small quantities of starch, the character of which is quite different from that of the false root mentioned further on. The roots are dug up in the months of September and October, when the plant begins to be torpid. They are chopped into pieces, from 2 to 6 inches long, and exported without further preparation, the quantity collected being, according to Dr. Falconer, from 10,000 to 12,000 kharwans (of 192 lbs. each). The commodity is laden on bullocks and exported to the Punjab, whence it finds its way to Bombay, and a portion to Calcutta, through India. It is chiefly cultivated in the Kashmir territory. According to Cleghorn, it is also exported from Pangi on the Upper Chenab. Its uses appear at the present time to be chiefly as a perfume, as a protection to bales of cloth from insects. In the Punjab it is applied in powders to ulcers, for worms, in wounds, etc., and for toothache, and it is also given in rheumatism. Assistant-surgeon Raheem Khan says that it acts as diuretic, emmenagogue, absorbent, and as an antidote for animal poisons. It also acts as an aphrodisiac and anthelmintic, and, he adds, is a good tonic for the liver and stomach.

Substitutes.—The Kashmiris say that this drug is apt to be adulterated with five or six other kinds of roots. Dr. Birdwood remarks that the root of a plant with the native name of *poshkar*, believed to be a species of *Lingularia*, is used for adulterating *Kost*, and the Kashmiris of Lahore make the same statement. A sample of false Costus in the Indian Museum, under the name of *Kut mitha*, consists of pieces of cylindrical root from 1 to 3 inches in length and from ½ to 1½ inches in thickness, externally nearly smooth, or longitudinally striate with transverse paler scars. It is much lighter and less compact than Costus, friable and farinaceous internally, very much subject to attack from insects, with little or no apparent odor or taste, and containing a large quantity of starch, the granules of which are very variable in size, attached to each other in twos and threes (as in Fig. 53, drawn by camera lucida to a scale of 500 diameters). Several other adulterants are also referred to by the author. Although Costus is sometimes called "Orris root," it must not be confounded with the rhizomes

FIG. 53.



Starch of False Costus.

of Iris. True Orris root is also met with in India, though, perhaps the produce of a species of *Iris*, differing from *Iris Florentina.* An extensive "Bibliography" of the subject is appended to the author's paper. Ph. J. Trans., July 21st, 1877, p. 41.

Referring to Mr. Cooke's article on Costus, Prof. Flückiger gives some additional information relative to its microscopic character and history. He finds the microscopic structure of the root to agree well with Guibourt's figures in his "Histoire naturelle des Drogues simples," iii (1869), p: 33. The author has already remarked in his pamphlet "Die Frankfurter Liste," Halle, 1873, p. 25, that the tissues of the root abound in *inulin*, and shows, especially in the bark of the branches of the root, large *balsam ducts.* In both these respects costus root agrees well with elecampane and other aromatic roots of the Compositæ. The microscope, therefore, affords further evidence of the correctness of Falconer's suggestion, that costus is derived from *Aplotaxis;* at least, inasmuch as inulin is not to be met with in any other natural orders than in the Compositæ and a few allied orders, viz., Campanulacæ, Goodeniaceæ, and Stylideæ. Starch is usually wanting in these plants, and he found none in costus. Externally costus-root, likewise, reminds of elecampane, although it is much more woody. Curiously enough, Dioscorides alludes to this fact, pointing out that elecampane from Northern Syria (Kcmmagene) might be substituted for costus. Mr. Cooke has already pointed out that costus continues still in the East to form an important article of trade. It was so from time immemorial. Aitchison notices the strong violet-like odor given off by the root and retained for a very long time by the sacks in which it is packed. The author observes that the odor may be different in the fresh state from what it is in the dry drug; for a sample in his possession rather reminds, in this respect, of German chamomiles. He suggests, that while the chemistry of elecampane is far from satisfactorily investigated, quite interesting information has already been obtained. It would, therefore, be well worth while to submit costus-root—the elecampane of the East—likewise to chemical examination. Ph. J. Trans., Aug. 18th, 1877, p. 121.

Pterocaulon Pycnostachyum, Ell.—Prof. J. M. Maischd escribes the rhizome of this plant, which is known in Georgia as "*Black-root*," and there enjoys some local reputation as a valuable alterative. The rhizome is horizontal or oblique in the ground, and when viewed from above has a compact but knotty and somewhat contorted appearance. Its most striking peculiarity is, that on the lower side it divides into a number of closely-set tuberous branches, which are nearly perpendicular and somewhat conical, grow to the length of about an inch, and are suddenly contracted, each into one thin, wiry rootlet, of about one to two inches. The rhizome has a thin bark, which is externally of a black color, internally grayish-brown, and adheres but loosely to the tough wood, which is grayish or blackish brown, and divided into numerous very narrow wedges, loosely connected by the shrunken, narrow, medullary rays, from which the tangential surface, after the removal of the bark, assumes a lace-like appearance. The rootlets have a similar character, only the bark is relatively thicker. The recent rhizome branches, from which over-ground stems have grown, are scarcely one-quarter inch in diameter, but on their lower surface show already the disposition of sending off the perpendicular, cylindric-conical branches described, and as the latter decrease in size the stem-bases become almost obsolete, and are reduced to mere scars, more or less concave. The entire rhizome is inodorous, the wood tasteless, and the bark slightly acrid and peculiarly bitterish. Dr. F. P. Porcher, who mentions that the aforesaid valuable alterative properties are attributed to the drug, states that it is well known as the *black-root* of the negroes, and that it is used in form of decoction. Nothing is known of its chemical constituents. A. J. Ph., Feb. 1878, p. 53.

Tschuking or Zerechtit.—The leaves, flowers, and fruits of a Compositæ,

Ubyæa Schimperi, are said to constitute an Abyssinian drug named as above. Specimens of this drug, composed of the inflorescence of a Compositæ, which resembles flores millefolii very closely, have been subjected to chemical analysis by Prof. Dragendorff. The small flower-heads have been collected without the pedicles, and in the course of time have fallen asunder. They are nearly globular, about 2 mm. in diameter, and are provided with a manifold, strongly hirsute involucre. The receptacle is, in so far as can be judged by the present sample, naked and hemispherical, and the author believes he recognizes on this, sterile, short, tongue-shaped, white ray-florets, and fertile, nearly white disk-florets. A portion, moreover, was already deflorate. The odor of the drug reminds of millefolium, but it also faintly reminds of cynæ and tanacetum. The odor is bitterish-aromatic. The plant grows in all parts of Abyssinia, at an elevation of 5000 to 10,000 feet above the level of the sea, preferring fields, appearing in June and ripening in October, at which period the drug is gathered. The drug is used in Abyssinia in the latter stages of the malarial disease called "Kolla-sickness," being applied, together with soap, in the form of a poultice to the calves of the legs, to relieve the cramps attending that stage of the disease. It is also used internally as a mild antispasmodic, and in concentrated decoction is said to be tonic and diaphoretic. The author's analysis of the drug gave the following components in 100 parts: Moisture, 6.11; ash, 9.23; sand, 2.81; ammonia, 0.93; albumen, 0.93; other albuminoids, 11.74 (total nitrogen, 2.75 per cent.); cellulose, 35.19; vasculose, fibrose, etc., 2.57; pararabin, 2.27; pectin, 2.32; mucilage soluble in water, 1.98; carbohydrate (not glucose), 11.26; volatile oil, 1.72; fat and a little chlorophyll, 1.50; resin and chlorophyll, 2.05; tannic acid, 2.82; tartaric acid, together with a little oxalic and citric acids, 3.61; oxalic acid as calcium salt, 0.96. Traces of bitter principle were also found. The remedy probably possesses no advantages over flores millefolii, or flores chamomillæ. In view of the fact that the infusions of the drug froth strongly, the author searched for saponin or an allied body, but fail to find such a constituent. Arch. Ph., Feb. 1878, p. 116–125.

Pellitory Root.—G. C. Close expresses the opinion that the statement in the Dispensatory, to the effect that pellitory is a powerful irritant, is incorrect, and that it seems to have only mild stimulant properties. To this Prof. Maisch retorts, that the fresh roots of *Anthemis pyrethrum*, Lin., and of *Anacyclus officinarum*, when applied to the skin produce redness and blisters; their virtues seem to depend partly upon volatile oil, but mainly upon acrid resin. A. J. Ph., Dec. 1877, p. 587.

Santonica—Estimation of Value.—Prof. Dragendorff has determined, and recommends the following simple method for estimating the value of European wormseed: 15–20 grams of the drug are digested for two hours on the water-bath, with 15–20 cc. of a 10 per cent. solution of soda and 200 cc. of water; the mixture is thrown on a filter and the residue washed with water. The united filtrate and washings are evaporated to 30–40 cc., and the concentrated liquor immediately *neutralized* with hydrochloric acid and filtered, the filter being washed with 15–20 cc. of water. The filtrate is then *acidified* with HCl, and shaken three times successively with 15–20 cc. of chloroform; the chloroformic solutions are washed with water, evaporated to dryness, the residue dissolved in a little solution of soda, the solution filtered, the filter washed with a little water, the united filtrate and washings *acidified* with HCl, and allowed to stand 2–3 days, when the crystallized santonin may be collected on a filter, washed with 10–15 cc. of an 8 per cent. solution of soda, dried at 110° C. (= 230° F.), and weighed. For every 10 cc. of aqueous solution (not the wash-water) from which the santonin has been precipitated, a correction of 0.002 gram, and for every 10 cc. of soda solution used for washing the precipitated santonin, a correction of 000.3 gram may be made by adding such quantity to the actual weight obtained. The quantity of volatile oil contained in the wormseed may also be ascertained when determining its value; the method being that hitherto recommended by the author for the estimation of volatile oils (see Volatile Oils). Santonica may contain 2.25 per cent. of volatile oil, and about 3 per cent. of fat and resin soluble in petroleum ether. Arch. Ph., April, 1878, p. 300–307.

Cynara Scolymus.—Prof. K. Landerer states that artichokes, the unexpanded flower-buds of Cynara scolymus—*ankynaros* of the Greeks—are among the most favorite vegetables of the Orient. The juice colors the skin a beautiful reddish brown, which color is with difficulty got rid of. The involucral scales are used for dyeing the hair brown, also for staining wood of a mahogany color. The name cynara is supposed to be derived from *kyon* (dog), because the scales of the anthodium are hard and pointed like the eye-teeth of a dog. A. J. Ph., April, 1878, p. 174.

RUBIACEÆ.

Cinchona—Distribution of Alkaloids in Cinchona Tree.—In 1875 (see Proceedings, 1875, p. 170), D. Howard called attention to the constant presence of quinidia in renewed bark of *Cinchona succirubra* and *C. officinalis*, and in the root-bark of *C. officinalis*, in much greater quantities than in natural stem-bark. Since then he has had many opportunities of confirming these observations, the renewed bark of both species invariably showing a greatly increased percentage of this alkaloid. He finds, however, that by very careful testing of considerable quantities of the alkaloid from *C. succirubra*, it is possible to obtain quinidia in quantities from a minute trace to 0.06 per cent. of the bark in that from Ootacamund, Darjeeling, and Java. Recent importations of the root-bark of *C. succirubra* and *C. officinalis*, from Darjeeling, and of *C. succirubra, C. Ledgeriana*, and *C. Hasskarliana*, from Java, have given an opportunity to extend our knowledge of the root-bark. The specimens from Darjeeling are of special value, as the root, stem, and branch bark sent over together may safely be taken as representing the produce of the same trees, whereas there is no information as to which of the various parcels of stem-bark sent from Java, the small quantities of root-bark sent with them belong.

In examining the root-bark from Darjeeling the high percentage of alkaloids is remarkable. It is in all cases much greater than that yielded by stem-bark of the same trees, usually in the proportion of eight to five, and the great difference in the proportion of the different alkaloids in the stem and root is equally striking. In all the specimens that the author has examined of the *C. succirubra*, the great increase is in the dextrogyrate alkaloids, quinidia and cinchonia, and to a small extent in the slightly dextrogyrate amorphous alkaloids. The percentage of quinia and cinchonidia in the bark averages slightly less in the root than in the stem, but more than in the branches; but the total variation in these alkaloids between the stem and the root of the same tree is much less than between different samples of either from different plantations; the percentage of cinchonia, on the other hand, seems invariably in the root-bark from twice to three times as great as that in the stem-bark; and that of the quinidia is increased from the minute quantity above stated to 0.2 to 0.3 per cent. The increase of the amorphous alkaloids is much smaller, being usually in the proportion of eleven to ten. A comparison with the quill-bark from the smaller branches shows even more decidedly this difference in the distribution of the alkaloids, the total quantity of alkaloids as well as the proportion of dextrogyrate alkaloids being less. The following examples illustrate the author's remarks. He includes the alkaloids contained in the root-fibre, which, as will be noticed, contain even a higher percentage of quinidia than the alkaloids of the root-bark; but this may be owing to the fact that it is impossible to separate the bark from the wood in the small roots, which are from the thickness of a quill to a mere fibre, and therefore impossible to give the percentage of alkaloids in the bark without the woody portion.

	Branch.	Stem.	Root.	Root-fibres.
Total Alkaloid, . .	3.3	5.5	7.6	2.0
Composed of Quinia, . .	23.5	20.2	11.5	13.0
" Quinidia, . .	.6	.6	2.9	11.4
" Cinchonidia, .	25.3	23.6	19.9	11.7
" Cinchonia .	19.4	32.8	47.3	46.7
" Amorphous, .	31.2	22.8	18.4	17.2

The root-barks from Java of *C. succirubra*, *C. Ledgeriana*, and *C. Hasskarliana*, all show the same tendency to the development of dextrogyrate alkaloids, and while, as has been mentioned, there is no information what stem-bark belongs to the root-bark, it is interesting to note that in each case the root-bark contains more of these alkaloids than any single specimen of the stem-bark, and greatly more than the average. It seems, therefore, that there is an invariable tendency in the bark of the root of various species of cinchona to produce the dextrogyrate alkaloids in greatly increased proportions, and this is the more noteworthy because the production of lævogyrate alkaloids in the root-bark varies exceedingly, according to the species and habitat, being sometimes greater and sometimes less than that in the stem-bark of the same trees.

The renewing of the bark has only been carried on as yet on the Neilgherries, but it is to be hoped that the great commercial success which has attended the experiment will lead to its adoption, if practicable, elsewhere, when it will appear whether the modification of the alkaloid follows the same rule under all circumstances.

The variations shown by the *C. succirubra*, under the influence of climate and soil, are also very interesting. This species of cinchona alone seems to be sufficiently hardy to adapt itself to varied circumstances, growing alike at Darjeeling, where the other species have proved almost total failures, in the Neilgherries, where the climate seems the best suited for the *C. officinalis*, and in Java, in the habitat so singularly favorable to the *C. Ledgeriana*. The proportion of the alkaloids varies, however, very distinctly under these varied circumstances. Except under the artificial treatment of renewing the bark, it is never rich in quinia, but the cinchonidia and cinchonia show very interesting variations. In Java the cinchonidia predominates in a most marked degree. On the Neilgherries, though cinchonidia is still predominant, cinchonia shows an increase. On the Himalayas the bark shows a diminished yield of cinchonidia, but a marked increase of cinchonia and amorphous alkaloid. Ph. J. Trans., July 7th, 1877, p. 1.

Cinchona, Cultivation in Bengal—Progress.—C. H. Wood has recently read a paper on the progress of the cinchona cultivation in Bengal, in which the information gathered since the commencement of the cultivation is summarized. The first attempt at the cultivation of cinchona in Bengal was made by Dr. Anderson, the superintendent of the Botanical Gardens, Calcutta, in the year 1861, with some seeds received from Kew. Thirty-one plants were thus obtained. In 1862 these, with several new species from other sources, had increased to 289 plants, and in 1864 the first little patch of 500 cinchona trees was planted on the present site in Sikkim, in the valley of Rungbee, 12 miles from Darjeeling, where the number of cinchona plants now growing is in round numbers 3,000,000, covering a total area of about 1900 acres, and of this number five-sixths are *Succirubra* trees, the cultivation of which has proved a decided success in Sikkim. It is hardy, growing well under a sufficiently wide range of conditions, it seeds freely, and from its little disposition to run into other varieties, it can be easily propagated. Of the other species of cinchona cultivated earliest at Rungbee, *C. Pahudiana* proved worthless; *C. micrantha* yielded a bark rich in cinchona, and, therefore, least valuable; *C. officinalis*, while rich in quinia, did not thrive under the climatic conditions of Sikkim; while *C. Calisaya*, although, doubtless, the most valuable species cultivated in Bengal, yielding a bark very rich in quinia, and containing but a small proportion of the other alkaloids, grows under more limited conditions than Succirubra, is more difficult to propagate, and has, therefore, not made anything like the same progress. Analyses of the bark of six leading Calisaya varieties, made in 1874, will give some idea of the value of this species, and justifies the continued attention that is given to the latter varieties in the hope of overcoming the difficulties of cultivation.

Cinchona Calisaya varieties.	1	2	3	4	5	6
Total alkaloid, ...	1.6	6.1	5.57	7.1	5.75	7.4
Alkaloid soluble in ether, . .	0.82	5.9	5.21	6.93	5.75	7.4
Crystallized sulphate of quinia, .	None.	4.53	4.6	6.92	5.34	6.2

Experiments made with *C. Pitayensis* have failed. As stated before, the *Succirubra* trees are estimated at five-sixths (or 2,500,000) of the total number now growing on these plantations. In the progress of cultivation a certain amount of bark was annually obtained from these by the necessary pruning and thinning; and in 1875–6, in addition to that got by this means, a crop of bark was taken by cutting down and stripping a large number of trees. The following table shows the total amount of dry *Succirubra* bark yielded up to March, 1876:

Collected by pruning and thinning,	1869–70	2,400	pounds.
" " "	1870–71	12,500	"
" " "	1871–72	39,000	"
" " "	1872–73	Nil.	
" " "	1873–74	16,000	"
" " "	1874–75	39,405	"
Crop of	1875–76	211,931	"
Total		321,236	"

During 1874 and the beginning of 1875, a number of experiments were made with a view of determining somewhat accurately the amount of *Succirubra* bark that could be harvested annually without injuring the plantations. For this purpose a large number of trees of different ages were cut down, and the bark stripped from each separately weighed in the green state. Every precaution was taken that the trees selected should fairly represent the whole. The bark of the roots was not taken in these experiments.

Average weight of dry bark per tree, at different ages.

	Bark peeled from stem and large branches.	Bark scraped from small branches.	Total.
Trees planted in 1865	2.52 pounds.	0.41 pounds.	2.93 pounds.
" " 1866	2.06 "	0.38 "	2.44 "
" " 1867	2.27 "	0.33 "	2.60 "
" " 1868	1.05 "	0.34 "	1.39 "
" " 1869	1.01 "	0.33 "	1.34 "
" " 1870	0.92 "	0.39 "	1.31 "
" " 1871	0.34 "	0.12 "	0.46 "
" " 1872	0.26 "	0.12 "	0.38 "

From the data collected it was estimated, after making a liberal allowance in different directions, that if all the trees were regularly cut at the completion of their seventh or eighth year (a corresponding portion being at the same time planted) an annual crop of 366,000 pounds of bark could be safely taken without diminishing the permanent value of the plantation.

The quality of the Succirubra bark thus obtainable has also been made the subject of considerable investigation. Samples of bark taken from the lower part of the stems of the finest trees of different ages, have yielded the following percentages of total alkaloids:

	Total alkaloid.
No. 1 trees planted in 1866	6.7 per cent.
" 2 " " 1867	7.3 "
" 3 " " 1868	6.8 "
" 4 " " 1869	6.6 "
" 5 " " 1870	6.6 "
" 6 " " 1871	6.0 "
" 7 " " 1872	7.7 "

Experiments, however, have shown that the proportion of total alkaloid is greatest in the bark of the root, and diminishes as we go up the stem to the branches. The composition of the total alkaloid also varies appreciably, according to the part of the tree from which the bark is taken. Numerous analyses of samples taken from bark actually harvested, indicate the average yield of total alkaloids to be from 4 to 5 per cent., the average composition of which may be represented as follows: Quinia, 16.31 per cent.; cinchonidia, 30.53 per cent.; cinchonia, 35.26 per cent.; amorphous alkaloid, 17.90 per cent.

The total alkaloid from Nos. 1, 6, and 7 of the barks mentioned in the above table, yielded the following products:

From 100 parts of dry bark.	No. 1. (1866.)	No. 6. (1871.)	No. 7. (1872.)
Total alkaloid, ...	6.7	6 04	7.68
Alkaloid soluble in ether, . .	2.4	2.73	2.17
Cinchonidia, ...	1 9	1.99	2.95
Cinchonia, ...	2.4	1.31	2.56
Crystallized sulphate of quinia, .	1.3	1.35	0.82

Ph. J. Trans., Feb. 9th, 1878, p. 621.

The author also reviews the manufacture and therapeutic value of the "cinchona febrifuge" (see Proceedings, 1877, p. 305) from Succirubra bark, from which it appears that there is preponderating evidence that this preparation possesses very nearly the antiperiodic properties of quinia, and that it may be safely substituted for the latter in the treatment of ordinary fever and ague.

Cinchona Cultivation in Ceylon.—J. Laker MacMillon communicates some interesting facts regarding cinchona cultivation in Ceylon. The cultivation is yet in its infancy. Nevertheless it was computed in 1877 that 4000 acres were under cultivation, and that some 2000 more would shortly be planted out. Several million of plants exist in nurseries ready for planting. The variety of cinchona in favor is the Succirubra, this being the variety that pays, the variety that thrives, that requires little attention in propagation, and that costs next to nothing to rear. It may be found growing luxuriantly everywhere, in the mountain provinces, on fertile estates, and on the paténa soils, around government out-houses, and remote police stations, in the various Kacheri grounds and gardens of government residences; from the ancient kingdom of Kandy to the confines of the principality of Ouvah. So familiar indeed has it become to the eye of both colonist and native, that it is looked upon as indigenous; the latter having now the fullest confidence in it as a remedy and not hesitating to help himself to a strip of bark from the nearest tree when occasion necessitates it. The exports of bark from Ceylon have of late been considerable, and the prices obtained fair. The author, therefore, ventures to believe that in a few years Ceylon will prove a formidable rival to either and all the Continental Presidencies in the production of this material alone. Ph. J. Trans., April 20th, 1878, p. 829.

Cinchona Cultivation in Java.—Dr. C. Hasskarl, in his report on the Cinchona Cultivation in Java, 1877, draws attention to a peculiar disease to which the cinchona trees are subject, which he traces to the presence of an insect belonging to the Hemiptora—the *Heliopeltis theivora.* It is this insect, also, that produces the so-called rust in tea plants; and it appears to infest only certain plants that have been introduced in Java, notably also fuchsias and a variety of datura, being never found on indigenous plants. The insect occurs in such quantities, that it is almost impossible to protect the plantations from its ravages, and threatens to seriously affect the cultivation of cinchona as well as of tea. Zeitschr. Œst. Ap. Ver., No. 2, 1878, p. 30.

The harvest has terminated after the third quarter. During the three months there were sent to Yicao, for shipment to Holland, 63,220 ℔s. of bark, and 3130 ℔s. for the medical service. About 7000 ℔s. more were ready for consignment. In September an enormous quantity of seeds was sent out. At this time the number of plants in the plantation were: 318,113 in the nurseries and 1,872,299 in the open air, of which the large preponderance are *Calisaya Ledgeriana* and *Hasskarliana*, and the next in quantity the *officinalis*. Ph. J. Trans., March 30th, 1878, p. 774.

Cinchona Calisaya Ledgeriana.—In an editorial in "Ph. Jour. and Trans." (Nov. 24th, 1877), an interesting account of the history of the *Cinchona Calisaya Ledgeriana* is given, from which the following is extracted:

The seeds of this plant were obtained by Mr. C. Ledger, through the medium of a native of Peru, named Manuel, who travelled with him between the years 1841 and 1858. This man had been collector of cinchona bark, and had the repute of being intimately acquainted with the value of the different kinds, and notwithstanding the obstacles thrown in the way of obtaining cinchona plants or seeds by the Peruvian authorities, Manuel undertook to obtain for Mr. Ledger a quantity of seeds of the best kind. Early in 1865 Mr. Ledger returned to Peru, and some months afterwards Manuel hearing of his return brought him a quantity of seeds which he had collected in the Bolivian province of Caupolican. These were originally intended to be offered to Sir Wm. Hooker, but in consequence of his death, the illness of Sir Joseph (then Dr.) Hooker, and the absence of Mr. Markham, Mr. Ledger finally disposed of a portion of the seeds to the Dutch government for a preliminary consideration of £8 10s., and a further consideration of £42 10s., when, in 1866, Van Gorkum reported that from these seeds about 20,000 plants had been raised. The rest of the seeds were purchased by Mr. Money, on the recommendation of Mr. J. E. Howard, and sent to India.

At first the plants grown in Java were considered to be but slightly different from the *Cinchona Calisaya* already in cultivation there, but fortunately the new plants were kept separate, and soon proved to be so rich in quinine—the bark now yielding 6 to 9 or 10, and even 13 per cent. of that alkaloid—that it is now regarded the most valuable cultivated variety. Mr. Moens, who has at various times subjected the bark to chemical examination, has calculated that the net profit resulting from the cultivation of this variety of cinchona on the Java plantation was, in 1874, 100 per cent. over all expenses; that in 1876—ten years after the plantation was commenced, the net profit amounted to £4070 10s. and that this does not include the value of 3320 of the original trees still remaining, and 4085 living stumps, the bark from which, if collected, would have increased the profit to upwards of £8000. Moreover, these calculations were made by Mr. Moens at a time when he was unacquainted with the recent high price of cinchona bark, amounting to about 50 per cent. in excess of that which he adopted in his calculations. According to the account given by Mr. Moens, cultivation and the use of manure have had the effect of increasing to a very considerable extent the amount of quinine. Referring to the fear entertained in British India that the attempt to cultivate *Cinchona Calisaya* from seeds would not be successful, on account of the possibility that the plants might deteriorate, Mr. Moens expresses the opinion that this would be equivalent to abandoning the cultivation, since the cultivation from cuttings is so difficult in the case of *Cinchona Calisaya* generally, and especially of the variety *Ledgeriana*. He considers this fear to be exaggerated, for though there always are among seedlings from one and the same tree some which are distinguished by the peculiar form or color of the leaves, still the greater number of them resemble the mother plant, a circumstance which obtains also with *Cinchona officinalis,* and to a less extent also with *Cinchona succirubra*. Experience, however, has shown that both these plants, as compared with the American mother plants, are as a rule richer in alkaloids than poorer. The trees of these varieties in Java are again seedlings from British Indian plants, and it is beyond doubt that the bark obtained from them in Java is not poorer in alkaloids than that from the mother plant in Ceylon and Madras. The plants raised from seeds of *Ledgeriana* vary amongst themselves considerably in the form of the leaf and even in the color and shape of the flowers and fruit, but nevertheless they all yield a bark which is very rich in quinine. Guided by the experience of several years Mr. Moens expresses the opinion that the average amount of quinine in the bark from trees raised from seeds of *Cinchona Ledgeriana* will be found to correspond with the amount existing in the mother plant; and that although in such a plantation there may be some trees yielding poorer bark, there would also be as many that would yield much richer bark than that of the mother plant. He is, therefore, of opinion that there is no reason to fear that the contents of alkaloid will either diminish or deteriorate.

Cinchona Pubescens, Howard—A Fast-growing Variety.—Dr. J. E. De Vrij draws attention to a fast-growing variety of cinchona, to which the late Mr. McIvor had given the above name, and of which he said in his last letter to Dr. DeVrij (dated April 6th, 1876): "Up to the present time *C. succirubra* has produced in the same period of growth more than twice as much stem-bark as any of the other species we have in cultivation, and *C. pubescens,* Howard, will produce nearly twice as much stem-bark in the same period of growth as *C. succirubra.*" A week later Dr. De Vrij received a box containing amongst other specimens a specimen of *C. pubescens,* How., first renewal, but he has not until now found time to make an analysis. This he has now made and has turned out, as will be seen in the following, very satisfactory: Total alkaloids, 9.47 per cent.; composed of pure quinia, 5.728 per cent. (= 7.637 per cent. crystallized sulphate); cinchonidia, 0.926 per cent.; cinchonia, 0.937 per cent.; amorphous alkaloid, 1.111 per cent. The author expresses the hope that Mr. Howard will be able to give some further explanation regarding this interesting variety of cinchona. Ph. J. Trans., April 13th, 1878, p. 805.

In the following number of Ph. J. Trans. (April 20th, 1878, p. 825), Mr. Howard gives the following additional information. Regarding the term *pubescens* for this variety of cinchona, he says this is unfortunate, since a distinct species has been so named by Vahl, and has been figured and described by Dr. Weddell. In correspondence with Mr. McIvor, who has obtained two sorts of *officinalis* from seed, which for some reason he considered to be hybrid, he had suggested that the one described by McIvor as having slightly pubescent leaves, should, for the sake of distinction, be designated (cinchona officinalis) *var. pubescens,* and this was unfortunately changed into *C. pubescens,* How.

Referring to the bark sent both to Dr. De Vrij and Mr. Howard, in 1873, Mr. McIvor says: "This bark is taken from a hairy-leaved variety of *C. officinalis.* It is a tree of wonderful growth. It produces enormously thick bark and the tree is not injured by the wind. The tree from which I now send you the bark is only five years old. It is twenty-six feet high and has a stem of sixteen inches in circumference at the ground, and the bark now sent you is taken in a strip from the stem to the height of about twelve feet from the ground. The tree grows at least twice as fast as *C. succirubra.* The bark of this variety which I sent to Dr. De

Vrij was taken from a tree growing at a high elevation and with a northwest exposure. The bark now sent you is taken from a tree growing at a low elevation and with a northeast exposure. Dr. De Vrij found the bark of this species to yield 10.67 per cent. of total alkaloids, with 4.72 per cent. of crystallized sulphate of quinia.* If under all conditions the bark is found to yield this amount of alkaloids, and especially quinia, it is certainly the best plant we can grow, being hardy and of rapid growth and perfectly free from canker and other diseases to which the *Officinalis*, and especially the *Calisaya*, are liable."

Mr. Howard's examination proved even more favorable than that of Dr. De Vrij, referred to in Mr. McIvor's letter, the quantities of alkaloids obtained corresponding to 6.00 per cent. sulphate of quinia, 5.00 per cent. sulphate of cinchonidia, and 1.20 per cent. of cinchonia and amorphous alkaloids; and this was even exceeded by a bark of the same variety, sent one year later (1874), which contained total alkaloids corresponding to 6.94 per cent. sulphate of quinia, 4.48 per cent. sulphate of cinchonidia, 0. 20 per cent. sulphate of cinchonia, 0.14 per cent. sulphate of quinidia, and 1.14 per cent. amorphous alkaloids.

In 1875, 20 acres of this variety had been planted the year previous and 60 acres during the year. The next year Mr. McIvor died and there is no further record in consequence.

Cinchona Bark—Relation of the Supply to the High Price of Quinia.—J. E. Howard contributed a very interesting paper to the Br. Pharm. Conference (see Yearbook of Pharm., 1877, pp. 514, 520), in which attention is drawn to the causes that have contributed to the then high price of quinia preparations. The immediate causes are the prolonged wars in the Columbian districts, which appear to have deranged the whole traffic. The author's views regarding the ultimate effects of cinchona cultivation, which is not likely to be confined to countries foreign to the cinchona, but is likely to be pursued in South America itself, are very encouraging; and, if the author's views prove correct, the supply of bark will in a short period no longer be dependent upon such eventualities as those that have brought about the present high prices. The author takes the opportunity to offer some timely suggestions regarding the nature of the trees that are likely to prove most valuable for purposes of cultivation, and likewise expresses his regret that the cheaper alkaloids should receive so little attention, notwithstanding there is abundant proof of their intrinsic value, which is in some instances even superior to quinia.

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* It must be remembered that the analysis refers to a bark sent to Dr. De Vrij, in 1873, and not to that to which Dr. De Vrij now specially draws attention, which is a renewed bark.

Coffee—Microscopic Examination, etc.—Some samples of ground coffee and of coffee essence, gathered indiscriminately from the grocer trade of New York city and Ann Arbor, Mich., were subjected to microscopical and chemical examination by Miss M. E. Johnson, who found all of the samples of ground coffee to contain also chiccory, three of these also wheat, and two of the latter beans. Of the essences, one was composed of liquorice-root, wheat and beans, two of coffee and chiccory, one of chiccory alone, and another of chiccory and burnt sugar. Prof. Albert B. Prescott, who communicates these results, observes that it is desirable that the average proportion of soluble matter in coffee should be established as a standard for analysis; for, similarly to cinnamon bark, cinchona, tea, etc., it is not at all improbable that unground coffee is partially extracted and sold again, whilst the extraction is used for producing essence of coffee. The statement regarding the amount of matter extracted from roasted coffee, at present available for comparison, varies from 20 per cent. (Hager), to 39 per cent. (Vogel, quoted by Wanklyn). Hassel reports 23 to 30 per cent. Miss Johnson determined the soluble matter, with several hours' boiling, to be 17 per cent. A. J. Ph., Oct. 1877, p. 492.

CAPRIFOLIACEÆ.

Viburnum—Useful American and Exotic Species.—The attention of Prof. J. M. Maisch was attracted to the genus Viburnum recently, when receiving from a correspondent in Georgia some branches of a woody plant, which were identified as belonging to a species of this genus. The specimens came from near Orange Springs, Florida, where the plant is regarded as possessing valuable medicinal properties as a substitute for quinia, and where it is called *black haw;* but it was mentioned that it differed from what is known by that name in some parts of the country. Owing to the absence of flowers and fruit, he was unable to identify the particular species to which the specimens belonged. Opportune to this subject, the author reviews the various species of Viburnum found in the United States, and gives an account of the chemical investigations that have been made from time to time with some of the species.

Viburnum Obovatum, Walt.—This species is mentioned in Gray's "Manual," and in Chapman's "Flora of the Southern United States," and it occurs on river-banks from Virginia to Florida. After giving a botanical description of the plant, the author states that the wood is tasteless, the bark has quite a distinct bitter taste, but that the bitterness of the leaves is by far the most persistent, and that the leaves would, therefore, appear to possess whatever medicinal virtue may reside in the plant.

Viburnum Prunifolium, Lin.—This occurs in the United States, from Connecticut to Florida, and west to the Mississippi, and is generally known as *black haw*. Dr. Phares, of Newtonia, Miss., in 1867, called attention to the properties of the bark of this species, ascribing to it nervine, antispasmodic, tonic, astringent, and diuretic properties, and recommending it as particularly useful in preventing abortion and miscarriage. The leaves, like those of the allied *V. nudum*, Lin., and its variety *cassinoides*, have occasionally been used as a substitute for tea.

Viburnum Opulus, Lin.—This species is quite extensively distributed. It is indigenous to Canada, and found in the Northern United States, and southward along the Alleghanies to Maryland; likewise throughout a great portion of Europe, and of the northern section of Asia. From the resemblance of its fruit to the cranberry, this species is known on this continent as the *high cranberry* or *cranberry tree;* its preference to moist localities, and the resemblance of its inflorescence to that of the elder, has caused it to be popularly called in Germany *wasserholder* or *water elder*. The *snow-ball* or *guelder-rose* is a cultivated variety of this species. The bark and flowers were formerly employed for their supposed alterative and antispasmodic properties; hence the common name *cramp bark*. The fruit, where it is frequent, is sometimes used in the place of cranberries.

Chapman enumerates nine species as being indigenous to the Southern United States east of the Mississippi; of this number, only one,

Viburnum scabrellum, Tor. and Gr., is peculiar to that section, while the remaining eight are likewise found in the Northern States, some extending into Canada; three additional species are found in the northern section, making twelve in all indigenous to the United States. Aside from V. prunifolium, the following are met with from the New England States south to Florida, the last two (perhaps all three) being likewise indigenous to Canada; they are:

V. Nudum, Lin., or Whiterod;

V. Dentatum, Lin., known as *arrow-wood*, and

V. Acerifolium, Lin., or *Dockmakie.* Their leaves have a bitter taste, while the bark is bitter and astringent. The author is not aware that they are medicinally employed in any part of North America.

There are about 28 *exotic species*, distributed over Europe, the Canary Islands, Africa, Asia, the East Indian Islands, the West Indies, and South America. Only a few of these appear to be put to some use.

Viburnum Dahuricum, Pall., produces a sweet fruit, which is eaten in its native country, the eastern section of Siberia.

Viburnum Tinus, Lin., is known as *laurestine* or *bastard laurel*, the *laurier thym* of Southern France, on account of its evergreen glossy leaves. It produces black-blue drupes, which are said to possess cathartic properties, and are, in some localities of the Mediterranean basin, employed as a remedy in dropsy.

Viburnum Odoratissimum, Ker, from China, is also evergreen, has very fragrant flowers, and is like the V. tinus, occasionally met with as an ornamental shrub.

Viburnum Lantana. Lin., occurs in thickets of Central and Southern Europe, and is known as *lithy tree* and *giddy berry* (Schwindelbeere). The gray-brown, smooth, or, when young, mealy pubescent bark has an acrid taste, and produces blisters when applied to the skin in the fresh state. The leaves have an astringent taste, and were formerly used in diarrhœa and similar complaints. The ripe fruit is black, mucilaginous, sweet, and astringent, and was employed in various inflammatory diseases. The branches have been used for making pipe-stems.

Chemical Investigations.—The species mentioned comprise all, in the author's opinion, that have been used in medicine, and only two of these, *V. opulus* and *V. lantana*, have been subjected to chemical investigation.

Chevreul observed in the berries of V. opulus a volatile acid, which he recognized as identical with the phocenic acid discovered by him in the fat of the dolphin. Dumas afterwards proved phocenic acid to be identical with valerianic acid. H. Krämer (1834) examined the volatile acid obtained from the bark of the same shrub, compared this *viburnic* acid with valerianic acid, and found it to differ from the latter; but in 1845 L. von Mono obtained results which appear to establith the identity of the two. Valerianic, acetic, and tartaric acids were found by Enz (1863) in the berries of V. lantana; he also found them to contain *iron-greening tannin*, an acid and a neutral bitter principle. In the bark of V. opulus, Krämer had previously found, besides malic acid and *iron-bluing* tannin, a bitter principle, which he named *viburnin*. This, when pure, constituted a nearly white powder, neutral, purely bitter, slightly soluble in water, more freely in alcohol, and on incineration left little ash. Enz's bitter principle was yellow, hygroscopic, readily soluble in water, and uncrystallizable.

The remaining constituents were those very generally distributed through the vegetable kingdom, such as pectin, resin, fat, gum, etc. The author suggests that it would be of interest to ascertain the nature of the bitter principle contained in the two species named, both of which are indigenous to this country and called black haw. A. J. Ph., Feb. 1878, pp. 49–53.

Hedera Helix.—The existence or non-existence of an alkaloid in the ivy has been the subject of controversy since Chevallier and Vandamme claimed its existence, the prevailing opinion being that the statement has been made in error. Robert H. Davies and Charles Herbert Hutchinson have engaged to determine this point, but are not yet prepared to decide the question. Following the method pursued by Professor Posselt, in 1849, they have isolated *hederic acid*, which, together with hedrotannic acid had also been obtained by Prof. P. As obtained by them, the so-called hederic acid is a white, amorphous powder. It is freely dissolved by hot alcohol, from which it is deposited to a great extract in cooling. It is slightly soluble in ether, and to a less extent in bisulphide of carbon, chloroform, benzin, or water. Its alcoholic solution, when largely diluted with water, froths strongly on agitation, resembling in this respect saponin. This property, together with the violet color produced when the hederic acid is treated with sulphuric acid, renders it probable that it is identical with the "new body" claimed to have been discovered by F. A. Harsten in the ivy (see Arch. Ph., April, 1875), since a quantity of that body, isolated by Harsten's method, showed precisely similar properties. The authors have found, that while the mother liquors from which the so-called hederic acid is obtained are decidedly acid, the pure substance is incapable of action upon litmus. It is probably a glucoside. Yearbook of Ph., 1876, p. 579.

R. H. Davies has continued the research on "hederic acid," chiefly with a view to determine its composition definitely. The burning of hederic acid by the ordinary process of combustion is very difficult, and gave unreliable results. But with a nitro substitution product he has been more successful. This gave numbers which correspond to the formula $C_{16}H_{25}(NO_2)O_4$, thus confirming the formula $C_{16}H_{26}O_4$ assigned to the original substance. The author has been unable to obtain any compounds of the "so-called" acid with either barium, calcium, potassium, sodium, aluminium or copper, and he is confirmed in his belief that the body is not an acid at all, although he has retained the name "hederic acid" for convenience. Ibid. 1877, p. 508.

Charles T. Kingzett has made some experiments with "hederic acid" furnished him by Mr. Davies, which point out the substance to be a glucoside, although he has been unable to isolate the sugar or to identify it as such positively. Of the sugar-like character of the decomposition product from hederic acid by the action of boiling dilute sulphuric acid, there can be no doubt. Ibid. p. 511.

LORANTHACEÆ.

Viscum Album—Analyses of the Ash of Mistletoe from Various Trees.—A. Benton and H. Grandeau have made comparative analyses of the ash of mistletoe growing upon poplar (I), locust (II), and pine trees (III), and of the wood of these trees, and communicates the following results :

	Wood of			Mistletoe of		
	I.	II.	III.	I.	II.	III.
Ash (excluding CO_2) .	3.037	2.063	1.609	3.461	2.132	3.139
Potassa, ...	6.557	2.354	8.396	16.093	15.903	30.791
Soda, ...	2.682	0.471	2.033	2.088	2.585	trace.
Lime, ...	66.467	75.038	67.429	32.555	45.392	27.133
Magnesia, ...	8.196	2.511	7.124	9.213	6.723	12.194
Oxide of Magnesia, .						10.670
Oxide of Iron, ...	2.384	1.884	1.017	5.405	2.198	1.524
Chlorine, ...	1.639	1.726	1.272	1.474	2.017	trace.
Sulphuric Acid, . . .	1.490	0.784	2.798	2.088	2.741	3.353
Phosphoric Acid, . . .	4.769	3.453	7.887	26.289	12.025	13.109
Silicic Acid, ...	5.813	11.773	2.033	4.791	6.413	1.219
Total, ...	99.997	99.994	99.989	99.996	99.997	99.993
Less the Oxygen corresponding to the Chlorine, ...	0.369	0.388	0.286	0.332	0.482	
Remainder, ...	99.628	99.606	99.664	99.664	99.515	
Carbonic Acid in 100 p. Ash, ...	27.470	31.765	25.878	16.636	20.167	18.990

The quantity of protein substance, fatty bodies, cellulose, etc., is also different in the mistletoes growing on the different trees. The large relative quantities of potassa and of phosphoric acid in the ash of the mistletoe is quite remarkable. Zeitschr. Œst. Ap. Ver., Oct. 1st, 1877, p. 454, from Comp. Rend.

D. W. H. Long highly recommends the mistletoe as an oxytocic, and an experience of twenty years with it causes him to believe in its superiority to ergot, for the following reasons:

1. Because it acts with more certainty and promptness.

2. That instead of producing a continuous or tonic contraction, as ergot does, it stimulates the uterus to contractions that are natural, with regular intervals of rest. Consequently it can be used in any stage of labor, and in primiparæ where ergot is not admissible.

3. It can always be procured fresh, does not deteriorate by keeping (?), and is easily prepared.

The remedy may be administered either as an infusion, tincture, or fluid extract. The infusion the author directs to be prepared from two ounces of the dried, or four ounces of the green leaves, by pouring on them a pint of boiling water and allowing to stand, covered closely, until cool enough to drink; two to four ounces of this, repeated every twenty minutes, being the dose. The tincture is made by saturating eight ounces of the dried leaves with boiling water, and adding alcohol to make one pint. It should stand ten days.

The mistletoe abounds throughout the West, and is found in the greatest quantities on the walnut and elm tree, though it grows sparingly on a few others, as the red and black locust, oak, etc. There appears to be no difference in its properties or strength by the kind of tree on which it grows. New Rem., April, 1878, p. 112.

Referring to the above paper, Dr. E. S. Crosier says that the mistletoe found in our woods is *not* the *Viscum album* of Europe, but belongs to another genus, of which several species exist in the United States. *Our* mistletoe is *Phoradendron flavescens* of Nuttall, and was considered by Pursh to belong to the genus *Viscum.* It belongs, however, to the natural order *Loranthaceæ*, only two of its twenty-five genera being indigenous to North America, *Phoradendron* and *Arceuthrobium*, the latter belonging to Mexico and the West Coast, where it is represented by *A. camphylopodium*, Engl., which was also discovered in Northern New York, in 1871, growing on the black spruce. The author gives also a summary of the American species of the mistletoe. New Rem., June, 1878, p. 178; from Louisville Med. News.

Arthur G. Hobbs has used the mistletoe as an oxytocic, and his experience confirms the observations of Dr. Long. Ibid.

UMBELLIFERÆ.

Anise-Seed—Presence of Conium-Seeds.—A. Pohl has recently had occasion to subject a parcel of Russian anise-seed, suspected to contain conium-seed, to examination. The microscope revealed seeds which differed in their character from the normal anise-seeds, but which could not be identified to be the seeds of Conium maculatum. By appropriate experiments he determined the presence of very small quantities of conia. The presence of this alkaloid, and the impossibility of identifying the seeds of Conium maculatum in the parcel examined, lead the author to suggest that possibly the presence of the poison is due to the formation of bastard varieties of anise—the two plants growing in the same soil, and flowering at the same period. The plants belonging to the same family and resembling each other very much in their organization, he considers it not unlikely that bastard forms should be produced, which, under favorable circumstances, might even bring forth fruit. Ph. Centralh., No. 12, p. 103.

Cicuta Virosa.—The most poisonous part of the plant, according to Trojanowski, is the root. The ethereal oil contained in this has no poisonous action, but the activity appears to reside in certain bright-yellow drops contained in the resinous cortical zone, and from this a homogeneous, tenacious, non-drying, amorphous, highly-poisonous resinous material can be obtained. Two or three milligrams are sufficient to poison a frog, and a cat is killed by the intravenous injection of 0.007 gram. It is proposed to name it *cicutoxin.* It is absorbed slowly, the symptoms only appearing after twenty minutes, and sometimes not until after the lapse of several hours. The mode in which it gains entrance into the blood when injected is not very clear, since it is insoluble in water. In medico-legal cases, where no part of the structural elements of the plant can be discovered, it may still be possible to obtain sufficient of the resin by macerating the stomach in ether to make a physiological experiment on a frog.

The actions of "cicutoxin" are remarkably similar to those of "picrotoxin" (from *Anamirta cocculus*), of "Coryamyrtin" (from Coryaria myrtifolia, of the resins of digitalis and of taxus, and those of the baryta salts. These collectively form the so-called "group of convulsive poisons." They act as violent excitants of a limited region of the medulla oblongata near the apex of the calamus scriptorius, of the convulsive centre discovered by Heubel in the frog, the existence of which has also been demonstrated by Nothnagel in mammals, and also to some extent to all the other centres situated in the medulla oblongata. The general symptoms produced by these poisons are well shown by the injection of a small quantity of "cicutoxin" beneath the skin of a frog. Ph. J. Trans., Nov. 3d, 1877, p. 345.

Thapsia Garganica and T. Silphium—Chemical Examination.—Herlaut claimed to have demonstrated that an Algerian plant, to which the name *Thapsia Silphium* has been given, and which was alleged to be the source of the *silphion* of the ancients, was identical with the *Thapsia Garganica* of Europe. Admitting this as proved, Yvon has made a chemical examination of the root of both plants, with a view to determine whether the growth of the same plant in different latitudes affected its composition.

Exposed to prolonged heat in a stove, the root-bark of *Thapsia Garganica* lost 12.93 per cent. of water, that of *Thapsia Silphium* lost 17.35 per cent. The dried substances give the following results upon analysis:

		T. Garganica.		T. Silphium.
Organic matter,	91.24		90.26	
Starch,		22.510		26.124
Gum,		5.179		5.421
Gum-resin,		5.759		4.271
Resin,		2.554		3.192
Albumen,		1.354		0.624
Inorganic matter,	8.76		9.74	
Lime,		1.365		1.368
Magnesia,		0.677		0 697
Iron,		0.370		0.224
Alumina,		0.338		0.508
Sulphuric acid,		0.297		0.300
Phosphoric acid,		1.468		1.919
Chlorine,		0.219		0.420
Silica,		2.715		0.707
	100.000		100.000	
		100.000		100.000

An examination of this table shows that there is a considerable concordance between the mineral constituents of the plants (root-bark? Rep.) dried at 100° C. (=212° F.), and almost as great in the organic constituents, the quantity of resinous matter being nearly the same. Inquiries directed to ascertain what influence the nature of the soil might have, brought out the fact that in Algeria the plant grows equally well in all soils. In consequence of the presence of resinous matter, the author does not speak decisively as to the existence of an alkaloid in the plant. Examined under the microscope, the starch of the two kinds appears to be similar except as to size, that of the *T. Silphium* varying in diameter from 0.004^{m} to 0.015^{m}, and that of *T. Garganica* from 0.006^{m} to 0.026^{m}.

Although the amount of resin obtained from the two plants was so nearly the same, it differed considerably in activity. During the extraction of the resin from the root-bark of *T. Silphium,* which was done by exhausting it with 99° alcohol, after previous treatment with 60° alcohol, there was given off a peculiar, not unpleasant aromatic odor, that was not observed with the *T. Garganica.* The activity of the silphium resin, moreover, was found to be excessive. In spite of all precautions, a stay in the laboratory during the evaporation of the alcohol, produced a rather painful sensation of heat, which afterwards became localized in the nostrils, eyelids, and especially in the neck behind the lobes of the ears. After twelve hours of intolerable itching at these points a very intense miliary eruption took place, together with swelling of the eyelids and finally desquamation. The same symptoms followed a renewal of the work after two months. A curious point is that the hands and arms were not affected. Nothing of the kind occurred during the manipulation of the garganica resin. Ph. J. Trans., Sept. 1st, 1877, p. 162; from Jour. de Pharm.

RANUNCULACEÆ.

Clematis Cirrhosa or Sylvestris.—Prof. X. Landerer states that he has been able to recognize in a substance that has locally acquired some reputation as a remedy against epilepsy, the root of the *Clematis cirrhosa* or *sylvestris.* In two cases of epilepsy treated with the decoction of this root, which is strongly diuretic, there has been a cessation of the attack for more than three months. The bruised fresh leaves of the plant act as a rubefacient, and sometimes even as a vesicant when applied to tender parts of the skin. Ph. J. Trans., Aug. 18th, 1877, p. 126.

ANONACEÆ.

Xylopia Longifolia, D. C. (*Fruto de Burro*).—The fruits of the long-leaved "bitter tree," which flourishes throughout the valley of the Orinoco, enjoy quite a reputation as a febrifuge, and, possessing a distinct peppery taste and odor, faintly reminding of pimento, appears to be of some value as a spice. T. F. Hanausek has subjected samples of the fruits, exhibited in Vienna from Venezuela, and derived from Guiana, to chemical and microscropic examination, and has communicated his observations to "Zeitschr. Œst. Ap. Ver.," Dec. 10th, 1877, p. 571. The chemical examination evidences the presence of an abundance of starch, a volatile oil, a soft resin, a tannin-like body, coloring matter, fixed oil, mucilage, and a large quantity of gluten. Its composition corresponds to that of good spice, but whether the reputation of the drug as a therapeutic agent is justified, does not appear from the chemical examination to which the Xylopia fruits were subjected.

BERBERIDEÆ.

Podophyllum Peltatum—Constituents.—W. C. A. Bush has prepared the resin by mixing the concentrated tincture:

1. *With water*, by which he obtained a light-gray precipitate, completely soluble in ether and alkalies, and, on adding a little muriatic acid to the turbid decantats, a dark-gray precipitate, which was nearly insoluble in ether, but readily in alkalies.

2. *With acidulated water*, a grayish precipitate, which retained its color if dried at ordinary temperatures, but became a blackish-brown mass at a higher temperature, and was restored again to gray by re-solution in alcohol, precipitation and drying at ordinary temperatures, completely soluble in alcohol and alkalies, and partly in ether. Yielding very little ash. The hot aqueous solution precipitated in cooling; cold water dissolved very little of the resin.

3. *With alum solution*, a bright-yellow pulverulent precipitate, darkened somewhat by hot water, but not fusing to a brown mass. The ash contained mainly alumina, which was removable from the resin by boiling with dilute hydrochloric acid.

The officinal resin prepared by the author was found to yield 60 per cent. of its weight to ether, and this portion dissolved in alcohol with a light-brown color, forming a bitterish solution, which formed a light-gray precipitate in water, a bright-yellow in solution of alum, and an orange-yellow precipitate in solution of acetate of lead. The resin insoluble in ether had a bitter taste, was soluble in alcohol and alkalies, slightly soluble in water; its alcoholic solution was precipitated gradually grayish in water, and somewhat darker, but not yellow, in solution of alum and of acetate of lead. The bright-yellow color of the resin precipitated with alum solution is, therefore, due to the resin soluble in ether.

Except in one instance, neither of the resins gave evidence of alkaloid by Mayer's solution. Neither did they give the reaction for glucose after boiling with dilute hydrochloric acid. The acid aqueous liquor, in which the resin had been precipitated, however, gave evidence of sugar by Trommer's test. (See also "*Resinæ*" in this Report.) A. J. Ph., Nov. 1877, p. 548.

RUTACEÆ.

Barosma Ericifolia, Andr.—This drug, a species of buchu leaves, has found its way into the Liverpool markets, and is described by

E. M. Holmes. The leaves are very small, resembling in size and shape the leaves of the heath, whence the specific name. The odor of the leaves is powerful, but differs somewhat from that of the officinal species, having a slight resemblance to the odor of caraways. They are used by the Hottentots in the same way as the officinal kind, and, also, as a perfume, and in the form of tincture as an application to wounds. Ph. J. Trans., Nov. 10th, 1877, p. 363.

Empleurum Serrulatum, Ait.—E. M. Holmes draws attention to the leaves of this plant, which have recently occurred in the Liverpool market, and which are mentioned in "Pharmacographia" as being offered for buchu in England. The characters pointed out in that work render it an easy matter to distinguish it from the leaves of *Barosma serratifolia*, Willd., the species which it most closely resembles. One feature, however, not noted in that work, is very easily observed. When a leaf of *Barosma serratifolia* is held up to the light the lateral veins are seen to be much straighter, longer, and more strongly developed than in the leaves of *Empleurum serrulatum*. Ph. J. Trans., Nov. 10th, 1877, p. 363.

MALVACEÆ.

Cotton-root Bark—Constituents.—Charles C. Drueding has subjected cotton-root bark to chemical examination, and has separated: a *red resinous coloring principle,* wholly soluble in alcohol, ether, and in aqueous solutions of ammonia, potassa, and soda, and precipitated from the latter solution by acids; a *peculiar yellow substance*, possessing the same chemical reactions as the resinous principle; a blackish, semifluid *fat*, which is saponifiable; *tannin*, *glucose*, *gum*, and *chlorophyll*. The bark yielded 6 per cent. of ash, containing sodium, calcium, magnesium, iron, and sulphuric and phosphoric acids. A. J. Ph., Aug. 1877, p. 386.

STERCULIACEÆ.

Sterculia Scaphigera, Wall.—Among other remedial substances in the well-known "Notes on Chinese Materia Medica" (communicated to Ph. J. Trans., 1861, 1862), by the late Mr. Daniel Hanbury, is a notice of the "Ta-hai-tsze," or,

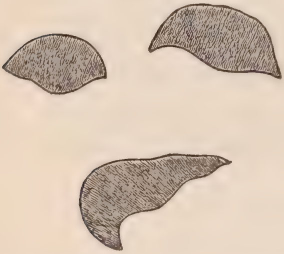
Boa-tam-paijang, the seeds of which were introduced into France many years since as a remedy for diarrhœa and dysentery, but were ascertained not to give satisfactory results. In the notes referred to they are described as the fruits of *Erioglos-*

sum (?) or *Nephelium* (?), but from specimens contained in the Kew Museum, which were apparently obtained from the first sample brought to Europe, and which have been named *Erioglossum edule*, Bl., Mr. J. R. Jackson has determined them to belong to *Sterculia scaphigera*, Wall. This plant differs in its fruits from most of the *sterculia*. They are of a thin papery texture and follicular or boat-shaped in form, with veins or nerves running parallel the whole length. As the fruit ripens this follicle bursts, leaving the solitary erect seed, which is attached to the base, exposed to view. This seed is brown and wrinkled, and is accurately described and figured in Mr. Hanbury's notes. It seems that these seeds have been mistaken for entire fruits, the large papery follicle, which easily becomes detached, not having been present in the samples described. Whether these seeds, which are said to be produced in great quantities, can be utilized for any other purpose than that for which they were first introduced, is, in the opinion of the author, a point worth considering. They are extremely mucilaginous and gelatinous. Ph. J. Trans., March 22d, 1878, p. 747.

Cola Acuminata, *Schott et Endl.* (*Sterculia acuminata*, *Beauv.*; *Cepa de Cola.*)—T. F. Hanausek has subjected some cola-nuts, from Venezuela, which had been on exhibition in Vienna, to microscopic and chemical examination. Their botanical origin is designated to be *Cola acuminata*, Schott et Endl., but unfortunately they are unaccompanied by material whereby their origin (as regards species) could be decided beyond controversy. It is to be regretted also that the nuts were at least 5 years old, since their chemical examination has revealed nothing to which the properties for which they are valued—the correction of putridity in water, the hardening of the gums, etc.—is attributable. It seems, therefore, necessary that some of the author's experiments will have to be repeated with fresh samples; for, notwithstanding the most careful work, the seeds under consideration gave evidence mainly of starch-granules, very little tannin, a yellow product of infiltration (coloring matter?), and a mere trace of a volatile oil, possessing a faint odor and taste.

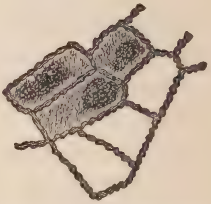
The cola seeds are red, or chestnut-brown, here and there covered with blackish, not distinctly defined, spots, the cotyledon edges somewhat lighter colored. They are the size of a hazel to a walnut, their longitudinal diameter being from 1 to 2.5 ctm., their breadth from 0.5 to 2 ctm. Their surface is wrinkled, provided with fine, raised lines and streaks, but towards the funiculus, which is indicated, they are smoother. In their shape they resemble a more or less flattened egg, but inasmuch as the samples are generally composed of two separated cotyledons, its form, and especially the location of the germ, cannot be well determined. The inner surface of the cotyledons is always uneven, the edge generally bent forward, a transverse section presenting the appearance of Fig. 54. Frequently one cotyledon is twice the size of the other belonging to it, in which event the smaller one is situated in a corresponding depression in the layer. This remarkable difference in the size of the two cotyledons, which is presented constantly in cola seeds, appears to occur but rarely in other seeds. The surface of a nut is light-yellow and shows, when examined under the lens, numerous glistening white spots (starch). Remains of the inner seed-coat are present. This is very delicate, yellowish white, and is composed of tubular, 4 to 6 cornered cells, the membrane of which appears to have porously thickened in such manner that the outline of the cells have a zigzag appearance. (Fig. 55.) They contain dark-yellow, somewhat granular masses, which seem to represent a coloring matter. This thickening of the cell-wall is extremely characteristic of the seed-coat. The length of these cells is on an average, 0.016 to 0.020 mm.

FIG. 54.



Cola acuminata. Sections of Cotyledons.

FIG. 55.

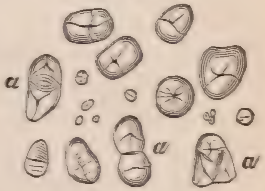


Section through Seed-coat.

The cells of the cotyledons form a soild, somewhat ligneous-appearing parenchyma, and are filled with a profusion of starch-granules. They occasionally contain bright-yellow masses, like the cells of the seed-coat. These masses are only partially dissolved by boiling potassa solution, and not at all by ether or alcohol. Ferric chloride produces a blue-black color on the cell-walls, which are, therefore, the carriers of the tannin. Tests made for albumen and sugar were in the negative. Freshly cut surfaces have a faint odor of nutmeg. Their taste is insignificant.

The starch-granules of cola acuminata are partly single and partly double; occasionally, but rarely, triple granules are found, but these are never specially distinct. They have no distinctly preponderating form, are sometimes round or oval, then again angular and faintly depressed. They are large and small, similar to wheat starch. The hilum is always in the centre of the granule and is traversed by two or often many radial lines, which often reach to the edge of the granule, and thus frequently produce a stellate appearance. By immersion in chromic acid concentric streaks are produced (Fig. 56), but these are visible only under strong deflection. The largest granules measure 0.028, 0.024, 0.016 mm. in length, and 0.020 to 0.01 mm. in width. Zeitschr. Œst. Ap. Ver., Nov. 20th, 1877, p. 534.

FIG. 56.



Cola acuminata. Starch-granules of Seed.

Cacao—Assay.—E. Heintz concludes from his experiments that cacao dried at 25° C. (= 77° F.) should yield not over 3 or 4 per cent. of ashes (Surinam cacao 1.8 per cent., Caracas 4 per cent.). If partly deprived of the fat it still retains 27 to 37 per cent. of it, and should yield not over 4 to 5.5 per cent. pure chocolate, not over 1.5 to 1.7 per cent. of ash. Cacao shells yield 8.5 to 18.5 per cent. of ash, and if used for adultering cacao or chocolate, their ash will be increased in amount.

Twenty grams of the chocolate or cacao are exhausted with benzin and the solution is evaporated. The residue is fat, the purity of which is ascertained by ether. The undissolved portion is six times treated with water of 15° C. (= 59° F.), and the moist residue examined by the microscope, by which foreign starches and the spiral vessels and dark-red cells of cacao shells are easily detected. The residue is washed with strong alcohol (the filtrate must not be deeply colored), dried and weighed. The weight deducted from 20 grams, less the weight of the fat, indicates the sugar present; from which, however, 4 per cent. should be deducted, which is the average amount of cacao constituents which are soluble in water. A. J. Ph., Sept. 1877, p. 446; from Arch. De Pharm.

GUTTIFERÆ.

Calophyllum Inophyllum, L.—The fruits of this plant were among some casual drugs imported into Liverpool from Mauritius under the name of oil-seeds, and are described by E. M. Holmes. The fruits, as imported, consist of the hard woody endocarp. They are about the size of an English oak-gall, nearly globular, with a small projecting point at one end, and contain a yellowish-white oily kernel. According to the official report of the products in the India Museum, the seeds yield sixty per cent. of a fragrant green oil, fluid at ordinary temperatures, but beginning to solidify when cooled below 50° F. In India it is used as lamp oil, and also as an outward application for rheumatism. Although apparently unknown in English commerce, in 1847–8 nearly 4000 gallons of the oil were exported from Madras and Ceylon, on the Straits settlements. The tree yielding these seeds bears handsome white fragrant flowers, and the author remarks that there is a wide field for experiment among the native plants of India, for those interested in perfumery. Ph. J. Trans., Nov. 10th, 1877, p. 363.

According to Heckel and Schlagdenhauffen the commercial *Baume Marie, Green American Balsam, Oriental Tacamahac*, etc., is nothing else than the oil and resin of this tree, which is named *tamananou* and *pit* in Polynesia, and *kaï meu-how* in Cochin China. It is found from Tahiti and New Caledonia as far as Madagascar in the Indian Ocean. By incision, or spontaneously, it yields an oleo-resin, which is known as "Oriental tacamahac." The oleo-resin is accompanied by a *fixed oil*, which is called tamanon oil, and has a green color. New Rem., July, 1877, p, 207; from Rép. de Pharm., 1877.

Résine Chaï, from Cochin China.—Prof. Ed. Hanausek describes this resin, which is said to be the product of *Shorea rubrifolia*, and is produced in Cochin China. It exhibits a smooth surface, with depressions aad elevations reminding of impressions produced by a bark. Its structure is laminated, and small leaf-like splints may be removed from it in the longitudinal direction. An abundant admixture of leaves, cortical matter, etc., is observed in the pieces. It is particularly noticeable that the tolerably large leaf fragments are imbedded lengthwise in the resinous mass, *i. e.*, parallel to the layers of resin. The odor of the resin is feeble, but peculiar. It is somewhat harder than Kauri copal, completely and rapidly soluble in alcohol and chloroform, forming milky-turbid solutions, which on evaporation leave a white residue. Under the microscope an amorphous mass is exhibited, interspersed with a network of columnar crystals.

Résine de Chackamaque from Madagascar.—The samples of this resin examined by the author consisted of irregular pieces, with a smooth surface, with occasional depressions having a white, dusty coating; the latter is occasioned by crystals. The resin is fatty glistening, has a regular fracture, melts at about 90° C. (=194° F.), and the remelted and congealed mass is stronger glistening. It is harder than Chaï resin, its color is yellow, of various shades, and has a stratified structure, resembling in this respect the structure of agate. It has a strong and disagreeable odor. It is rapidly dissolved by chloroform, slower in alcohol, and in all solvents for resins. Viewed under the microscope the resin evidences an amorphous body interspersed with numerous profusely entangled crystals. The resin appeared to be free from fragments of cellular tissue. The author also describes a sample of

Résine de l'arbol à bréa, from Manilla.—The fractures of this resin are shapeless, yellow to dark brown, translucent to opaque masses, containing considerable quantities of cortical matter. It is softer but denser than Chaï resin, has a pleasant odor, reminding of Elemi, burns with a strongly sooty flame, melts at 80° C. (=176° F.), and forms yellow and viscous solutions with chloroform and alcohol. A piece immersed in water for 24 hours became soft and white, and the resin as well as the water became viscous; the latter acquired also a yellow color. Under the microscope the presence of bark and leaf-cells was visible. Two kinds of crystals were recognized; they are imbedded in a yellowish mass, which is interspersed with brown bodies. The one kind of crystals is tolerably large, columnar, and nearly as long but only half as broad as the whetstone-like crystals of abietinic acid; while the others, constituting the greater part, are in the form of needles, with long points or prisms. Zeitschr. Œst. Ap. Ver., Nov. 1st, 1877, p. 498.

AURANTIACEÆ.

Ægle Marmelos.—Sir J. Fayrer, M.D., draws attention to the valuable therapeutic action of the Indian bael fruit, especially in chronic diarrhœa, dysentery, or irregular action of the bowels, but that the fresh fruit should be used as it is in India. In the dry condition in which it is usually found in the English shops, and possibly also in the form of liquid extract (ext. belæ liquid), it is of doubtful efficacy. Steamers come from Bombay in twenty-six days (to England), and there is no reason why bael fruit should not reach England as fresh and fit for use as it is in India. Given in the form of sherbet it is pleasant and refreshing, soothing and demulcent, from its aromatic and astringent properties, and from the viscous character of the mucilage that surrounds its numerous seeds. It is also used with equal efficacy in the forms of conserve or marmalade, both pleasant to take. Ph. J. Trans., Jan. 5th, 1878, p. 522.

VITACEÆ.

Vine-leaves—Physiological Function.—Finding that grapevine-leaves contain a considerable quantity of starch, dextrin, grape-sugar, and bitartrate of potassium, Dr. H. Macagno (of Gattinara, Italy), was led to inquire into the conditions for obtaining these matters in the leaves and their probable relation with the ripeness of the grape. As a result of his inquiries he concludes that the grape-sugar and tartaric acid are chiefly formed in the superior leaves of the branches having fruit, and that the sugar production in the leaves increases as the grapes increase in ripeness, but diminishes after the vintage. Grape-sugar was also found in the branch itself bearing fruits, the leaves of which have been analyzed. A very small quantity of starch and dextrin is found in the branches, while, on the contrary, they abound in the leaves. One kilogram of the leaves contains 11.28 grams of grape-sugar and 3.77 grams of starch and dextrin, while the same quantity of the branches contained 8.25 grams of sugar, but only 0.98 gram of starch and dextrin. He is, therefore, induced to regard the leaves as the laboratories for grape-sugar production, and the young branches as the conductors to the fruit. Such a function of the vine-leaves explains the bad effect resulting from nipping off the vines during the estival season. This is shown also by Guyot, in his "Etudes des Vignobles de France." He observed in the Vosges Department a delay of ten days in the ripening of the grapes, in consequence of the vines having been nipped. The author obtained the same results by practical experiments in Italy. Twenty vines were nipped on the 7th of July, 1877; the others of the same vineyard remained in their natural condition. On the 26th of September the analysis of the grapes gave the following results:

	From the Nipped Vines.	From the Unnipped Vines.
Must in 1 kilogram of grapes,	581 grams.	620 grams.
Grapes without stones, ditto,	54 "	46 "
In the must:		
Specific gravity, . . .	1.069	1.075
Grape-sugar, ...	14.000 per cent.	17.541 per cent.
Total acidity, . . .	1.400 "	1.320 "
Fixed matter, . . .	21.750 "	21.950 "
Bitartrate of potassium, .	1.308 "	1.306 "

By nipping there was, therefore, lost 3½ per cent. of grape-sugar in the must, and about 4 per cent. of must in the grape. The nipping is useful if the vines do not bear well, or if the climate is rather cold; but where the production is abundant, nipping should be done with great care. Ch. News, Jan. 4th, 1878, p. 3.

Grapes—Researches on the Maturation.—C. Saint Pierre and L. Magniers find by their researches that grapes, when ripening, evolve carbonic acid, whether in the dark or on exposure to light. This disengagement takes place in inert gases as well as in air. The quantity of carbonic acid produced is always greater than the quantity of oxygen consumed. Grapes are capable of absorbing or of losing water, according as they are kept in a damp or dry locality. As the ripening advances the acids diminish and the sugar augments. The mechanism of ripening is as follows: The acids and the glucose are formed in the plant and the sap conducts them to the fruit. The acids are burnt there while the sugar is concentrated. When the ripening process is very far advanced the sugar is burnt in its turn. Ch. News, March 22d, 1878, p. 122; from Compt. Rend., Feb. 18th, 1878.

Australian Wines—Presence of Iron as a Natural Constituent.—C. R. Alder Wright has subjected some "Ruby" and "White" wines, produced at the Auldana Vineyard, South Australia, to analysis, and found them both to contain iron. That iron sometimes exists in the ash left on evaporating wines to dryness and incinerating the residue has long been known; but in many cases it is not so certain as to how far this iron was pre-contained in the grape-juice employed, and how far it was derived from substances added to the wine during the process of manufacture—notably from gypsum used in the "plastering" process adopted in some cases, or from impurities in the glucose, etc., added to the grape-juice so as to obtain a greater alcoholic strength. In the instance of the Auldana wines examined, however, there is every reason to believe that they are wholly unsophisticated, and it is known that contact of the grape-juice with ironwork of any kind is studiously avoided during its manufacture, the crushing of the grapes being effected by means of wooden rollers covered with felt, and the fermenting-vats, etc., being constructed of slate. The soil of the Auldana vineyard is exceptionally ferruginous, and there is a strong probability that the presence of iron in these wines is caused by this highly ferruginous soil, together, possibly, with climatic peculiarities.

The following numbers represent the analytical figures with the two varieties of Auldana wine. The alcoholic strengths are only close approximations, as each wine was heavily charged with volatile compound ethers, imparting a marked and peculiar bouquet, and communicating to the wines a higher exhilarating effect than that simply due to the alcohol present. It is noteworthy that the sulphates present are very low and in less quantity than the bitartrate of potassium, which indicates that no plastering has been adopted in either case, whilst the low percentage of grape-sugar shows that the fermentative process had been carried out very completely. The numbers represent the grams of each constituent per 100 cc.

	Ruby.	White.
Sp. gr. at 60° F.,	0.9874	0.9884
Alcohol and volatile compound ethers,	10.500	12 000
Grape-sugar,	0.207	0.248
Anhydrous sulphuric acid (SO_3),	0.043	0.048
" phosphoric acid (C_2O_5),	0.020	0.023
Chlorine (Cl),	0.015	0.015
Silica (SiO_2),	0.007	0.008
Bitartrate of potassium,	0.123	0.136
Potassa (K_2O) in other conditions than as bitartrate,	0.127	0.106
Soda (Na_2O),	0.026	0.023
Ammonia (NH_3),	0.007	0.010
Lime (CaO),	0.016	0.014
Alumina,	traces	traces
Magnesia (MgO),	0.025	0.027
Protoxide of iron (FeO),	0.001	0.001
Volatile acids (calculated as acetic acid),	0.214	0.108
Glycerin, dextrin, tannin, vegetable acids, etc.,	2.375	2.657
Water (by difference),	86.294	84.576
	100.000	100.000
Total solid constituents,	2.992	3.316
Total free acid (calculated as tartaric acid),	0.704	0.652
Total potassa present,	0.158	0.140

Matters left on incineration:

Alkaline portion, calculated as K_2CO_3,	0.131	0.089
Neutral substances soluble in water,	0.150	0.143
Matters insoluble in water,	0.060	0 076
Total,	0.341	0.308

The determinations of the state in which the iron present existed were made on a large bulk of the wine, and clearly proved its presence in either case to be in the form of ferrous salts. Ch. News, July 13th, 1877, p. 16.

Malaga Wine.—The "Drug. Zeitung" brings the following interesting observations relating to Malaga wines: The various sorts of Malaga wine, namely, white tart wine, white sweet wine, Lagrima, Parajete, imitations of Madeira, Sherry, and Port, Muscatel and Tintillo, and the so-called "Malaga color," are all made in the city of Malaga itself. The vintage generally takes place during the first half of August. The must is transported by donkeys to the regular wine manufacturers, who at once pour it into large vats, and afterwards into strong casks, which are left unbunged. After standing for about six weeks, it is mixed with 5 per cent of alcohol and drawn off into other casks, in which the fermentation terminates and the wine deposits argol. More alcohol is added to the "tart" than to the "sweet" Malaga or to "Lagrima." The latter, according to the statements of manufacturers, is the product of the ripest grapes, and exudes without pressure. No Malaga wine, however, is sold or used in its natural condition, but it is mixed with certain liquids, known as *vino tierno* and *vino maestro*, to impart aroma to the various sorts.

Vino tierno is made from grapes of the sort known as "Pedro Ximenes," by pounding them to a mass, moistening with one-third of their weight of water, and strongly expressing. The resulting liquid, after settling, is mixed with one-sixtieth part of alcohol and set aside for use.

Vino maestro is prepared and kept in smaller quantities; it is made by interrupting the incipient fermentation of the fresh must by the addition of 17 per cent. of alcohol, and thereby preserving the original aroma of the grape. Neither of these flavoring wines can be bought in the market, as each manufacturer prepares his own supply, sometimes with slight modifications of process. They are added in various proportions to the fully ripe wine, when the latter is about one year old, to make it *embocado*, that is, full-flavored and palatable.

Malaga color is a white, either tart or sweet wine, prepared by the addition of two liquids, "Arrope" and "Color."

Arrope is prepared by heating sweet white Malaga wine rapidly to boiling in a copper boiler over a wood fire, taking care to continue the boiling only a short time, and then letting it simmer down, in the course of about twenty-four hours, to one-third of the original volume. The product has the color and nearly the taste of a good Burgundy "Résiné," being only more bitter and having a burnt taste. It is of the consistence of thin syrup, and is added, to the amount of 8 per cent., to such white Malaga wines, of one year old, as are to be converted into brown wines. This addition, however, imparts more of taste than color, and in order to produce the proper tint, a quantity of the second liquid,

"*Color*," must be added. This is prepared from arrope, 80 liters of which are placed in a copper boiler of three times the capacity, to prevent boiling over. By means of a brisk fire and with stirring, the liquid is reduced, in the course of four hours, to about 50 liters, when immediately a mixture of 8 liters of water and 24 liters of fresh must are added to bring the measure back to the original bulk. This *color* is much darker than arrope, more liquid, and very bitter.

All Malaga wines improve by age. Wine-dealers are in the habit, when they have an order for a certain year's growth which is not in stock, to mix two wines of different years' production in the proper arithmetical proportions, and the product is said to be not inferior to the original. New Rem., Oct. 1877, p. 292.

Analysis of an Ancient Wine.—Berthelot has had opportunity to analyze a wine, the age of which dates back to the Roman era. It was contained in a glass vessel of peculiar shape (hermetically sealed by melting), and was found in a locality near Arles which had been a cemetery during the Roman occupation. The contents of the vessel—amounting to 25 cc.—were yellowish, somewhat turbid, distinctly alcoholic in odor, somewhat aromatic, and reminded faintly of wine which had been in contact with fatty bodies. The taste was alcoholic and somewhat sour. Calculated for 1 liter, the results of the analysis are as follows:

Alcohol, ...	45 cc.
Solid acids (tartaric acid), ...	3.6 grams.
Bitartrate of potassium, ...	0.6 grams.
Acetic acid, ...	1.2 grams.
Tartrate of calcium, ...	small quantities.
Acetic ether, ...	traces.

Chloride and sulphate were not detected. Coloring matter was no longer present. Only traces of sugar were found. Zeitschr. Œst. Ap. Ver., Sept. 1st, 1877, p. 409.

Wine—Preservation by Means of Salicylic Acid.—Prof. Hessler recommends that small pieces of wood, saturated with a melted mixture of paraffine and 2 per cent. of salicylic acid, be allowed to float upon the surface of the wine, and states that the formation of mould or vinegar fungus is completely prevented by such treatment. If mould has already formed upon the surface, a little alcohol is carefully poured on, whereby the fungous growth is destroyed, and sinks to the bottom. The above treatment will then prevent future development. Ph. Centr. H., Oct. 11th, 1877, p. 343.

Wine—Determination of Alcohol and Extract.—The ordinary methods for determining the extract of wines are either liable to inaccuracy—loss of glycerin by evaporization when the evaporation is conducted at 110° to 120° C. (= 230°–248° F.), or they require too much time, as when the evaporation is conducted at 50° to 70° C. (122° to 158° F.) over sulphuric acid. A writer in "Pharm. Centralh." (Nov. 18th, 1878, p. 161) recommends a method in which the limit of error does not exceed 0.05 to 0.07 per cent. of the weight of the wine, whereas by the process of heating to 110°–120°C. (= 230°–248° F.) the error may amount to from 0.1 to 0.3 per cent of the weight of the wine. The new method is as follows :

The sp. gr. of wine, at 15° C. (= 59° F.), is first determined. 100 grams of the wine (*A*) are then evaporated on the water-bath to about one-third its original volume, or until all the alcohol is vaporized ; the residue (*B*) is then brought to the original weight with distilled water, and its sp. gr. ascertained as before. The difference in the sp. gravities of *A* and *B*, subtracted from 1000, gives the sp. gr. of an alcohol of the same strength as the wine *A*.

The sp. gr. of the aqueous solution of extract *B* gives the percentage of extract in the wine, by consulting the following

TABLE OF THE QUANTITY OF EXTRACT IN THE AQUEOUS SOLUTION.
Temp. 15° C. (= 59° F.)

Extract, per cent.	Sp gr.	Extract, per cent.	Sp. gr.	Extract, per cent.	Sp. gr.	Extract, per cent.	Sp. gr.
0.50	1.0022	4.00	1.0183	7.50	1.0343	11.00	1.0508
0.75	1.0034	4.25	1.0194	7.75	1.0355	11.25	1.0520
1.00	1.0046	4.50	1.0205	8.00	1.0367	11.50	1.0532
1.25	1.0057	4.75	1.0216	8.25	1.0378	11.75	1.0544
1.50	1.0068	5.00	1.0228	8.50	1.0390	12.00	1.0555
1.75	1.0079	5.25	1.0239	8.75	1.0402	12.25	1.0567
2.00	1.0091	5.50	1.0251	9.00	1.0414	12.50	1.0579
2.25	1.0102	5.75	1.0263	9.25	1.0426	12.75	1.0591
2.50	1.0114	6.00	1.0274	9.50	1.0437	13.00	1.0603
2.75	1.0125	6.25	1.0286	9.75	1.0449	13.25	1.0614
3.00	1.0137	6.50	1.0298	10.00	1.0461	13.50	1.0626
3.25	1.0148	6.75	1.0309	10.25	1.0473	13.75	1.0638
3.50	1.0160	7.00	1.0321	10.50	1.0485	14.00	1.0651
3.75	1.0171	7.25	1.0332	10.75	1.0496	14.25	1.0663

The sp. gr. rises or falls with each 1° C. (= 1.8° F.) by 0.00024.

Wine—Determination of Glycerin.—Pasteur has determined that wine naturally contains from 6 to 10 grams per liter of glycerin. The latter is, however, used extensively to sweeten wines, being added in portions varying between 1 and 3 vol. per cents. E. Reichardt has, therefore, modified Pasteur's method for its detection, as follows: The wine is evaporated to dryness (consistence of extract? Rep.), the extract is treated with a mixture of alcohol and ether, whereby succinic acid (naturally present), some sugar, and the glycerin are dissolved; the solution is then treated with slaked lime, which converts the acid and sugar into compounds that are insoluble in alcohol, and the solution is then evaporated to dryness. On treating the dry mass with 90 per cent. alcohol, glycerin alone is extracted, and remains on evaporating the clear filtrate. Perfectly pure wines yielded by this method, which the author regards as perfectly reliable, 0.978 to 1.667 per cent. of glycerin. Ph. Cent. H., Aug. 30th, 1877, p. 282.

Wines—Presence and Detection of free Sulphuric Acid.—Nessler has found certain wines to contain from 0.03 to 0.06 per cent. of free sulphuric acid, the presence of which may be regarded as evidence that the wine is an artificial product. If 5 p. of sulphate of potassium and 4 p. of tartaric acid are dissolved in 1000 p. of water, and 120 p. of alcohol are then added, cream of tartar is deposited and free sulphuric acid, or bisulphate of potassium, remains in the liquid. The same change may occur during the fermentation of grape-juice, if free tartaric acid and sulphate of potassium are present. To determine the presence of free sulphuric acid, the author uses strips of filtering-paper, 30 to 40 ctm. long, which are suspended over the vessel containing the suspected wine, the lower end being allowed to dip into the liquid. By capillary action the liquid rises in the paper, and evaporating, leaves any sulphuric acid, which is not volatile under these conditions, at the highest point at which the strip is moist. After twenty-four hours the strip is dried at a temperature of 212° (on a water-bath) when sulphuric acid is indicated by the blackening or browning of the strip at the point mentioned, which may also become quite brittle. The presence of sugar to 0.05 per cent. increases the delicacy of the reaction; above that, the reaction is not so sensitive; with 1–2 per cent. of sugar it is not distinct, unless the quantity of free sulphuric acid amounts to 0.04–0.08 per cent. Ph. Cent. H., Oct. 4th, 1877, p. 329.

Artificial Wine Colors.—Prof. W. Stein has recently examined three samples of wine color, the product of a concern established for the production of "wine materials." Of these, two were red, while the third was designated as "Moselle green;" all of them had the consistence of syrup. One of the red colors, possessing a handsome red color with a blue tinge, by transmitted light, was proved to contain the coloring matter of the flower of Malva arborea; the second red had a brownish tinge, and proved to be a compound of sugar and fuchsin; it contained no arsenic. The "Moselle green" was found to contain iodine-green, tinted with caramel. Ph. Cent. Halle, July 5th, 1877, p. 217.

Wine—Determination of the Principal Coloring Matters used.—G. Chancel proposes a method for the determination of the principal coloring matters used in the preparation of artificial wines, which is based upon the circumstances that cochineal, indigo, campeachy-red, and alkana-red are precipitated by subacetate of lead. Ten cc. of the wine are treated with 3 cc. of solution of subacetate of lead, containing one-twentieth subacetate; the mixture is heated, filtered, and the filter washed. If the filtrate is colored, it contains fuchsin, which may be removed by acidulating with acetic acid, and agitating with amylic alcohol; if the fuchsin is present in very small quantities, it may be carried down with the precipitate, and may be determined in that. The precipitate is now dissolved by treatment with a 2 per cent. solution of carbonate of potassium; pressing this repeatedly on the filter. This dissolves the cochineal-red and indigo, as well as any fuchsin present, while campeachy- and alkana-red remain undissolved. If the wine was not artificially colored, the alkaline solution has a yellow or faint greenish-yellow color.

Cochineals.—The alkaline liquid is acidulated with acetic acid and agitated with amylic alcohol to remove any fuchsin that may be present. By this treatment neither the carminate or indigo-sulphate of potassium are decomposed, and they are insoluble in amylic alcohol. The liquid is now acidulated with sulphuric acid, and again shaken with amylic alcohol, which now takes up the carminic acid liberated.

Indigo.—The indigo-sulphuric acid remains in the lower liquid and communicates a blue color to it.

Campeachy-red.—The residual lead precipitated is now agitated with a 2 per cent. solution of sulphide of potassium, whereby the coloring matter of the campeachy wood and the natural coloring matter of the wine are dissolved. To distinguish between the two a few cc. of the wine are treated with a little carbonate of potassium, and one or two drops of lime-water are then added. The filtrate of natural wines is greenish yellow; if colored with campeachy wood it is handsome red.

Alkanet Red.—The residual lead precipitate is now shaken with alcohol, which, dissolving the alkana-red, assumes a red color. Ph. Cent. H., Oct. 25th, 1877, p. 356.

Wine—Determination of Fuchsin.—Pasteur and Wurtz recommend that 6 cc. of the suspected wine be treated with baryta-water until the liquid is faintly alkaline; this is then filtered and acidified with acetic acid, by which rosanilin, which is colorless in the baryta-water, is converted into rose-colored acetate of rosanilin, and may be removed by agitation with amylic alcohol. The supernatant layer of amylic alcohol will give evidence of the presence of as little as 2.5 milligrams of fuchsin. Ph. Cent. H., Oct. 25th, 1877, p. 356.

Red Wines—Composition of a new Test paper—Œnokrine.—Julius Miller has analyzed a test-paper, prepared in Paris and furnished at a high price under the name of "œnokrine," which he finds to be simply filtering-paper saturated with acetate of lead. The new test-paper appears to answer an excellent purpose for distinguishing between genuine red wines, and those colored by fuchsin, malva, logwood, etc.; but does not answer for wine colored with blue berries (huckleberries), with which the paper assumes the same gray-blue color that genuine red wines communicate to it. Wine colored with fuchsin produces a handsome red color; with malva flowers, a handsome blue; with logwood, a handsome blue. The author suggests the preparation of a test-paper, which differs from that called œnokrine, only in being much less costly, as follows: Dissolve 1 part of acetate of lead in 10 parts of water contained in a porcelain vessel, pass strips of white blotting-paper through the solution, and allow them to dry. Ph. Cent. H., Aug. 30th, 1877, p. 281.

Red Wines—Reaction of Coloring Matter.—In Buchner's Rep. (Nos. 11 and 12, 1876), a method for the detection of foreign coloring matter in red wines is given, which, according to K. Calmberg, is based on error. It is there stated that when 10 cc. of genuine red wine are diluted with 90 cc. of dist. water, and are then treated with 10 cc. of a concentrated solution of sulphate of copper, a scarcely perceptible greenish tint is produced; whereas, wine colored with malva flowers assumes in the course of several minutes a pure blue to blue-violet color. Calmberg finds the coloring matter, prepared by him from red grapes, produces under the above conditions immediately a handsome violet color if the solution of sulphate of copper is added hot, while, when the copper solution is added cold, the same violet color is produced slower. In both cases, the color becomes more intense after some time, without showing the least green tinge in the beginning. Arch. Ph., July, 1877, p. 47.

DIPTEROCARPEÆ.

Gurjun Balsam.—Prof. F. A. Flückiger received from Gehe & Co., of Dresden, a sample of resinous residue from the distillation of gurjun balsam, which that firm had named copaivic acid, in the evident belief of its identity with the product of copaïva. On examination, however, it proved to be an utterly different body. During the winter temperature he succeeded in obtaining it in handsome, isolated, well-formed crystals, by dissolving the crystalline crusts received in 12 parts of warm ligroïn, and exposing to the cold. Isolated crystals could not be obtained by evaporating the ligroïn solution. The new resin melts at 126° C. (= 258.8° F.) without loss of weight (Gurgunic acid melts at 220° C. (= 428° F.)); in larger quantities a temperature of 130° C. (= 266° F.) is required. The amorphous mass formed on cooling crystallizes in contact with alcohol (sp. gr. 0.830), in which the resin is much more soluble than in ligroïn; on platinum, small quantities may be volatilized without formation of much charcoal, the latter finally burning without residue. In all of its reactions it is completely neutral and indifferent; its saturated solution in ligroïn does not deflect the plane of polarization. It is soluble in conc. sulphuric acid with a red-yellow color, and again precipitated from such solution white by water. Melting caustic potassa does not affect it. The elementary analysis of Dr. Burr leads to the formula $C_{28}K_{46}O_2$. Arch. Ph., Jan. 1878, p. 59.

ERYTHROXYLACEÆ.

Coca—Physiological Effects.—E. B. Shuttleworth gives some testimony on the happy effects of coca in preventing fatigue in numerous cases that came under his immediate observation. Can. Ph. Jour., Aug. 1877, p. 1.

CEDRELEACEÆ.

Swietenia Mahagoni, L.—The wood of the mahagoni tree has, as is well known, been a desirable article of commerce for centuries, but very little appears in the literature relating to the fruit and the bark, both of which appear to find extensive application as medicinal agents in the countries in which the tree is indigenous. T. F. Hanauseck gives a very minute description of the fruit, locally called

Caoba Fruit—the paper being accompanied by numerous illustrations, mainly relating to its microscopic characters. It contains coloring and astringent matters, which are probably identical with those contained in the bark and described by Bancroft. The latter is known under the name of *amaranth-bark*, is quite bitter, has a faint odor, and is said to be used as a substitute for, and even as an adulterant of cinchona bark. The seeds contain a purgative oil—*Carapat oil*—and a peculiar bitter principle, which is remarkable for its persistent action. The fruit is a five-celled capsule; but it is never found in commerce in its entire condition, being found separated into 4 distinct parts: 1, the external, hard epi or mesocarp; 2, the inner sclerenchymatose endocarp; 3, the seeds, winged on one side; and 4, the prismatic central column, upon which the seeds are situated in shingle-like arrangement. Zeitschr. Œst. Ap. Ver., No. 1, 1878, pp. 9–15.

SAPINDACEÆ.

Guarana—Separation and Reaction of its Peculiar Tannic Acid.—Francis V. Greene has separated the tannic acid from guarana and has found it to possess some characters that distinguish it not only from the ordinary tannic acids but also from caffetannic acid. He proposes, therefore, to name it

Paullinitannic Acid.—This was isolated by boiling the fine powder with successive portions of 75 per cent. alcohol, distilling off the alcohol from the cold filtered liquid, diluting the residual liquid with water, treating with slight excess of baric acetate of lead, thoroughly washing the voluminous flesh-colored precipitate with distilled water, decomposing it with H_2S, and evaporating the clear final filtrate to dryness. So obtained, paullinitannic acid is amorphous, slightly yellow, semi-transparent, readily soluble in alcohol, and capable of crystallizing from aqueous solution over sulphuric acid under a bell-glass. It has the following reactions: With ferric salts, a greenish precipitate, turning brown on standing; ferrous salts, no precipitate, but after a time a dark-green color; fixed alkalies, a dark, reddish-brown color; ammonia, a lighter brown; lime-water, a grayish-brown precipitate; acetate of copper, a green precipitate, soluble in excess; neutral sulphate of copper, no precipitate; alkaline sulphate of copper is slowly reduced in the cold, rapidly when heated; nitrate of silver is reduced when heated, aurichloride is decomposed in the cold. Barium salts give dull-white precipitates (distinction from caffetannic acid); stannous chloride, a white precipitate. It resembles caffetannic acid in not precipitating tartrate of antimony and potassium, and by readily precipitating cinchonia and quinia, but differs from it in precipitating gelatin from solution. Its reaction with the alkaloids and gelatin serve to distinguish it from catechuic acid. With acetate of lead it gives a dull-white precipitate. It quickly decolorizes the solution of permanganate of potassium, and it gives a dark-red color with molybdate of ammonium, which is discharged by oxalic acid. It produces white precipitates with morphia and strychnia, and with aconitia and veratria with hydrochloric acid; it does not precipitate atropia, either in neutral or acid solution. It gives no precipitate with salicin or santonin, but produces a bright-yellow precipitate with piperin in presence of hydrochloric acid. A. J. Ph., Aug. 1877, p. 388.

PAPAVERACEÆ.

Opium—Production in Africa.—According to the "Leeds Mercury," a new competitor for the enormous profits of the opium trade with China has arisen, and appears to have excited alarm in India. A company was established during the past year at Lisbon, called the "Mozambique Opium Cultivating and Trading Company." From this it would appear that Portugal wishes to become the protector of free trade in opium, with the intention of competing with the opium producing districts in India. The promoter of the Lisbon company is Senhor Jose de Paiva Raposo, who receives 50,000 acres of open, unappropriated, and cultivated land belonging to the state in Mozambique, and has preference in the choice of "such lands as are suitable for the cultivation of the poppy," and also, "the exclusive right for twelve years to export opium free of duty through all the custom-houses of the province." A number of the opium cultivators who were taken from India to Mozambique, describe the land taken by the company as well adapted for opium cultivation, and say that very large out-turns may be expected. Ph. J. Trans., June 15th, 1878, p. 1008.

Opium—Presence of free Acetic Acid.—David Brown draws attention to the presence of free acetic acid in opium, a fact which does not appear to be generally known. From the frequency with which he has observed the presence of this acid in opium, he thinks it may be safe to set acetic acid down as a constituent of that drug. The quantity found, however, is very small. Its presence may be evidenced by distilling the aqueous extracts, neutralizing the distillate, evaporating to dryness, and decomposing the residue with sulphuric acid. Traces of butyric acid were observed in the crude acid. The author has also observed the presence of a pectin body, and confirms the observations made by Flückiger in 1869. Yearbook of Ph., 1876, p. 519.

Opium—Examination of Commercial Samples.—D. B. Dott has made a series of examinations of commercial samples of opium, by which he determined the percentages of morphia, of water, of aqueous extract, and of the residue insoluble in water. The table also shows the percentage of morphia contained in the extract, as obtained by calculation from the results of the assay, which is exceedingly interesting, inasmuch as it shows the variability in strength of extracts that may be prepared from opium containing the officinal quantity of morphia; the variability being due to the greater or less quantity of matter soluble in water. By referring to the table it will be noticed that the opium of sample 4 contains 7.57 per cent. of morphia; it yields 54.90 per cent. of extract, and the strength of this is consequently but 13.7 per cent. On the other hand, sample 12 contains 6.93 per cent. of morphia; but it yields only 20.10 per cent. of aqueous extract, which, therefore, has a morphia strength of 34.4 per cent. The method adopted by the author for his assays is a modification of that recommended by the Br. Pharm. The water was determined by drying; the extract by the difference between the weight of the dried opium and of the dry residue:

Description of Opium used.	Morphia, per cent.	Aqueous extract, per cent.	Residue insoluble in water, per cent.	Water, per cent.	Morphia in extract, p. c.
1. Turkey.	10.75	47.80	32.60	19.6	22.4
2. "	12.30	51.15	28.85	20.0	24.0
3. "	10.20	48.05	25.95	26.0	21.2
4. "	7.57	54.90	23.70	21.2	13.7
5. "	9.60	47.05	30.95	22.0	20.4
6. "	11.69	56.15	25.45	18 4	20.8
7. "	12.30	54.90	25.90	19.2	22.4
8. "	12.30	45.40	34.20	20.4	27.0
9. "	6.76	37.00	35.80	27.2	18.2
10. "	9.80	40.00	38.80	21.2	24.5
11. "	8 85	47.50	29.70	22.8	18.6
12. "	6.93	20.10	47.90	31.2	34.4
13. Persian.	6.00	59.20	26.80	14.0	10.1
14. "	8.50	60.60	27.40	12.0	14.0
15. "	2.10	58.10	25.90	16.0	3 6
16. " in sticks.	traces.	73.90	10.50	15.6	traces.
17. Malwa.	7.30	60.70	24.10	15.2	12.0
18. "	5.88	61.10	25.20	13.6	9.5
19. Egyptian.	7.00	56.90	28.30	14.8	12.3

Similar examinations were made of samples of various galenical preparations of opium.

Extract, liquid extract, and tinctures, obtained from reliable houses in London, Edinburgh, and Dublin, prove very conclusively that opium preparations are not remedies to be relied on. The proposition of Dr. Squibb, that the galenical preparations of opium be assayed and brought to a definite strength in morphia, is not likely to remedy the matter, since the trouble involved is so great as to deter the majority of pharmacists from adopting it. In the author's opinion, the abolition of the galenical preparations of opium, and the substitution of its alkaloids, will be the eventual remedy. Yearbook of Pharm., 1876, p. 498.

Opium—Assay for Morphia.—E. L. Cleaver has contributed an interesting paper, giving the result of experiments made with a view to determining the best method—of those that have hitherto been proposed—for determining the percentage of morphia in opium. The paper is divided into two parts: the first part being devoted to the study of the composition of opium, and the relation of these constituents, and especially of morphia, to solvents, the action of alkalies, acids, and of heat. In the second part the author applies the observations made to the existing processes used for opium analysis and points out their advantages or disadvantages. He finds the present process of the Br. Ph., which is that of Mohr with slight modifications, to be objectionable on account of the large quantity of water that is used, whereby, during the subsequent evaporation, a loss of morphia is occasioned, and because no account is taken of the loss of morphia by non-precipitation. The process, nevertheless, appears to the author the one best adapted, if modified as in the following:

1. The opium should be first treated with bisulphide of carbon or benzin.

2. The dried residue should then be mixed with its own weight of lime, and two or three times its bulk of some inert powder, such as pumice or glass. It is then to be percolated with water, the first part of the percolate being returned as fast as it runs through. By this means much less water will be required to exhaust the opium than would otherwise be the case. After the oipum is exhausted, which will be known by the liquid dropping through devoid of taste, the solution should be exactly neutralized with sulphuric acid, filtered, and the precipitate washed. The clear solution is then to be evaporated on a water-bath until its bulk is about half an ounce (from 100 grs. opium ? Rep.), and again filtered if requisite; then ammonia is to be added in slight excess, and the liquid allowed to stand twenty-four hours. The precipitate can then be collected, washed with ether, and dried, and to the amount found must be added the amount corresponding to the quantity of water used in precipitating and washing (water dissolves 1-1000th part). The morphia obtained by this process is of a dull-white color, crystalline, perfectly soluble in alcohol, acids, and alkalies.

It requires notice, that the preliminary treatment of the opium with bisulphide of carbon, or benzin, has the advantage of removing the narcotia almost completely, and the opium subsequently requires less water for exhausting the morphia. The removal of the narcotia enables the better determination of the exhaustion of the opium, since it communicates bitterness to the water long after the morphia has been removed. The slight loss of morphia entailed by its use, may be compensated by adding 0.005 grain for every 10.0 cc. of the solvent used to the amount of morphia afterwards found. The author appends the following table, showing the amount of morphia obtained by different processes on samples of dried powdered opium:

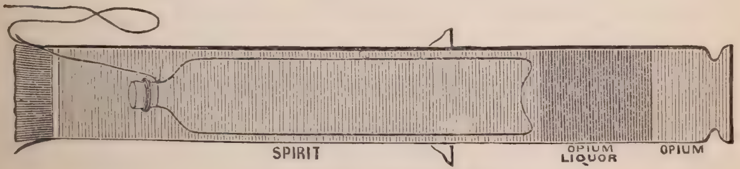
Variety of Opium.	Arnoldi.	Flückiger.	Guibourt.	Schacht.	Schacht, Improved.	Guillermond.	B. P.	B. P., Improved.
Turkish, . . .	26.0	9.5	10.2	11.0	12.8	9.8	12.1	13.0
Persian, . . .	25.0	8.0	9.0	11.0	13.0	8.7	12.3	13.4
Indian, ...	13.0	3.0	3.6	4.0	5.2	3.2	4.9	5.6

Yearbook of Pharm., 1876, pp. 502–511.

B. S. Proctor has also communicated an interesting paper on opium assay. His experience teaches him that no single process, yet devised, will be accurate for all varieties of opium. No two samples of opium are precisely alike, and consequently in no two assays are the alkaloids presented under conditions which precisely coincide. He recommends the following process, which has given good results in his hands: The opium (200 grs.) is rubbed to a pulp with water (½ oz.) in a mortar, mixed with methylated spirit (1½ oz.) gradually added and the whole put into a percolator; more spirit is added, until the opium is exhausted (7 to 14 ozs.). The solution is then evaporated to a syrupy consistence, adding a little water towards the end to insure the complete evaporization of the spirit, and the liquid is then diluted with water (4 ozs.), by which means a considerable quantity of caoutchouc, fat, resin, coloring matter, narcotia, etc., are thrown down, forming sometimes a soft plastic mass, which may remain attached to the bottom of the dish, and which, by repeated experiments, has been found to be devoid of morphia. The clear liquid is now evaporated to a small bulk (½ oz.), an equal bulk of methylated spirit is added, and then ammonia added in excess. Twelve to eighteen hours are allowed for the deposition of the alkaloids, which are then collected on a filter, washed with a mixture of equal parts of methylated spirit and water till the washings are almost colorless, then with water till a drop on evaporation leaves an insignificant residue. The precipitate is then dried, and contains morphia in yellow or brown crystals, and narcotia, usually silky white. To remove the latter the precipitate is washed, while on the filter, with benzin so long as a drop evaporated on a slip of glass leaves any conspicuous residue. As soon as the benzin evaporates the morphia is in a condition for weighing. The author believes the process to be an improvement on that of the Br. Ph., but does not consider it as yet perfect. The process of extraction is satisfactory; the evaporation and precipitation of inert matter, followed by the addition of spirit before precipitation of alkaloids, is advantageous, but may perhaps be improved by some intermediate treatment, such, for example, as boiling with lime. The treatment of the precipitated alkaloids is satisfactory as regards the washing with weak spirit, then with water, and, after drying, with benzin. He considers it desirable to avoid the necessity for redissolving and again precipitating the morphia on account of time and loss of material, and only advises the purification of the washed and dried precipitate, if on treatment with lime-water it is found to be contaminated with much color or a palpable amount of insoluble matter. Finally, he advises that no one trust very much to his recommendations. He usually makes two assays of a sample by different methods, and whether they agree or differ they are a check upon one another and a lesson on the applicability of the processes. Ibid. 511.

With a view to further expediting the extraction of the opium Mr. Proctor has modified the mode of operating thus: Rub the lump of opium with its own weight of water, to as smooth a pulp as possible, if necessary with the aid of gentle heat; add spirit equal to about three times its weight, and transfer to a percolator tube, which is furnished with a loosely fitting inner tube closed at both ends, for increasing the hydrostatic pressure. A vial filled with water and corked answers well for the inner tube, a string being tied round the neck, by which it may be let down gently till the bottom of the vial just touches the surface of the opium liquor (see Fig. 57). Its position may then be fixed

FIG. 57.



Apparatus for Assaying Opium.

by pressing the string between the side of the tube and a cork wedge. When thus arranged, more spirit may be added, till a column of 6 or 8 inches is obtained without disturbing the marc or mixing to any appreciable degree with the opium liquor, and without using more spirit than is required for the exhaustion of the opium. The author makes some further remarks in support of his above proposed method for assaying opium. He observes also, that the degree of dryness to which the analyst reduces his samples of opium exceeds considerably that to which the bulk is reduced by the drug grinder. Powdered opium, fresh from the mills, loses 5 to 6 per cent. of its weight by further drying. Moist opium loses from 19 to 27 per cent. Ibid. 1878, p. 529–532.

Opium—Assay.—Prollius recommends the following method: The opium is extracted according to the process of the Pharmacopœia (Ger. Rep.), 1 part of opium to 9–10 parts of 34 per cent. alcohol. 10 parts of this tincture are then well shaken with 5 parts of ether and 0.2 parts of liq. ammon. caustic., and the mixture is then allowed to rest 12–24 hours. Both strata of liquid are at first clear, but crystals of morphia gradually separate at the point of contact, and finally are deposited. The coloring extractive, the narcotin, and the remaing crystalline components remain in solution, partly in the ether, and partly in the hydroalcoholic liquid. The liquids are decanted, the crystals are washed with a little diluted alcohol, dried and weighed. The experiment generally corresponds to the yield of morphia in the process of its preparation. The method is distinguished from that of Guillermond, by the use of weaker alcohol and the addition of ether, and recommends itself by its simplicity. Schweiz. Wochenschr. f. Ph., Nov. 23d, 1877, p. 381.

Opium Alkaloids—Physiological Action.—The well-determined opium alkaloids now number sixteen. The effect of any one differs from the rest or from that of opium itself. Dr. Isaac Ott reports a large number of experiments which, added to previous knowledge, enable him to draw the following conclusions:

Cryptopia is a narcotic; it excites and then depresses reflex action by an effect on the spinal cord, reduces power of motor nerves, abolishes sensation by an action on the spinal sensory ganglia, and lowers the heart-beat by an action on its muscular structure.

Thebaina is a spinal convulsivant, has no action on motor or sensory nerves or striated muscle. It reduces the heart-beat by an action on that organ, and increases blood-pressure by stimulating the cerebral vaso-motor centres.

Codeia is a narcotic and spinal convulsivant, produces a veratroid contraction of striated muscle and depresses the heart-beat by an action on the cardiac muscle.

Chlorocodeia is a tetanic agent.

Apocodeia produces vomiting, coma, and death.

Narceina is soporific to cold-blooded animals, but not to man, and is a spinal convulsivant; it does not destroy the motor nerves, as they act on thrusting a probe down the spine; it produces veratroid contraction of the muscle, and reduces the heart-beat by stimulation of the peripheral end of the pneumogastric.

Papaverina is narcotic and convulsivant, the convulsions being spinal and partly peripheral, the latter, it is highly probable, from an action on the muscle; it diminishes the heart's contraction by peripheral action on the cardio-inhibitory apparatus; it also causes veratroid contraction of the muscle.

Narcotina is non-narcotic and a spinal convulsivant, produces veratroid contraction of striated muscle, and is a very active agent to decrease the beats of the heart by an action on cardiac muscle.

Cotarnia is soporific, and paralyzes, like curare, the motor nerves.

Hydrocotarnia is narcotic and convulsivant.

Hydrochlorate of cotarnamic acid (?) is a convulsivant; and paralyzes the pneumogastric.

Laudanosina and *laudania* are tetanic agents.

Morphia is a narcotic and spinal convulsivant; it produces veratroid contraction of muscle and reduces the heart-beat.

Oxymorphia has an action like morphia, only weaker.

Apomorphia is an emetic, excites and reduces spinal reflex excitability, and diminishes the number of cardiac contractions.

Meconin is narcotic to cold-blooded animals, but not in doses of two grains by the stomach in man; it causes hyperæsthesia and paralysis of voluntary motion, with general relaxation; it produces veratroid contraction.

The opium alkaloids all have a dominant action on the nervous system, causing first increased exaggerated functions, and, if the dose is large enough, a paralysis of them. In the warm-blooded animals this action is both on ths spinal cord and cerebrum. A J. Ph., June, 1878, p. 310; from Detroit Lancet, 1878.

PARONYCHIEÆ.

Sanguinaire or Thé Arabe.—J. R. Jackson has recently examined this tea, which is now being sold extensively in France, and is recommended instead of ordinary tea as a beverage for persons suffering from oppression at the chest, or from any difficulty of digestion, a teaspoonful being used for a cup of infusion. The author finds it to consist of the flowers and leaves of *Paronychia argentea*, and the tea is said to be prepared at L'Arba in Algeria, both from this species and *P. nivea.* He has information also that the term "Thé Arabe" by no means distinguishes this particular kind, inasmuch as it is given also to infusions of *Globularia alypum*, *Cistus albidus*, and *Verbena triphylla*, or *Aloysia citriodora.* An infusion of the particular sample under consideration, made by infusing a teaspoonful in a cup of boiling water, has scarcely any color, very little smell, and a flavor which is rather herby than aromatic. The principal vendor, M. Hugol, of Paris, states in his circular that the plant grows on the arid slopes of the Atlas Mountains; that the tea is composed of the dried flowers and small leaves, and that the infusion possesses a pleasant taste, and is decidedly beneficial in its action in all cases of colds, catarrhs, and chest affections. Ph. J. Trans., Jan. 5th, 1878, p. 521.

CUCURBITACEÆ.

Pumpkin—Occurrence of Glutamic Acid in the Young Plants.—E. Schulze and J. Barbieri have obtained glutamic acid from young pumpkin plants, by boiling with hydrochloric acid an extract of the plant made with equal parts of alcohol and water. The acid appears to exist in the plant in the form of an amide, since it is obtained only after boiling the extract with hydrochloric acid. The yield of the acid amounts to 1.75 per cent. of the dry substance of the plants. J. Chem. Soc., Sept. 1877, p. 324; from Ber. d. Deut. Ch. Ges.

Squirting Cucumber—Cultivation at Hitchin.—E. M. Holmes makes the following observations on the cultivation of squirting cucumber and the production of "elaterium," by Mr. Ransom at Hitchin. Only two or three acres are grown every year, there being comparatively little demand for elaterium. The plants are earthed up in winter, and require plenty of manure annually. The yield of elaterium depends much upon the weather, very little being obtained in a wet season. If the month of August is fine and dry the yield is not only larger but of superior quality. The drug as prepared by Mr. B. is of a fine ash-green color and comparatively sweet odor. This result is obtained by pouring off the supernatant liquor as soon as possible after the elaterium has deposited. If this be not done, fermentation is soon set up and the product depreciated in quality. Ph. J. Trans., Oct. 20th, 1877, p. 302.

MYRTACEÆ.

Eucalyptus Globulus.—Prof. Samuel Lockwood says, in the "Popular Science Monthly," that the *E. globulus* has earned, by fair experiment, its name of fever-tree, as a preventive, seems now to be settled. Its rapid growth must make it a great drainer of wet soils, while its marked terebinthinate odor may have its influence, and it is highly probable that the liberation of this essence into the air stands connected with its generation of ozone. But, whatever the sanitary activities of the eucalypt may be, the fact is squarely settled that spots in Italy, uninhabited because of malarial fever, have been rendered tolerable by the planting of *E. globulus*, and it is believed that a more plentiful planting would nearly, if not quite, remove the difficulty.

Eucalyptus in Algeria.—Consul-General Playfair writes: "Formerly it was impossible for the workmen at the great iron mines of Mokta el Hadid to remain there during the summer; those who attempted to do so died, and the company was obliged to take the laborers from the mines every morning and evening, thirty-three kilos each way. From 1868 to 1870 the company planted more than 100,000 Eucalyptus trees, and now the workmen are able to live all the year through at the scene of their labors." A. J. Ph., June, 1878, p. 312.

Eucalyptus Globulus.—Dr. Senftleben, who has just returned from a twelve months' expedition to the different parts of Southern Brazil, informs the editor of "Pharm. Jour. and Trans." (see Nov. 17th, 1877, p. 392), that the Eucalyptus tincture is used by the native doctors, and as a popular medicine in intermittent and remittent fevers, mostly in obstinate cases, and especially when relapses occur. This tallies with the reports of the Austrian practitioners who treated cases of ague contracted in the swampy countries of Hungary. In fresh or protracted cases of intermittent fever, where no remarkable enlargement of the spleen has yet taken place, quinine is by far the most reliable febrifuge. But where an "ague cake" has formed, and the recurring attacks depend rather on the causes locally remaining of the disease, the Eucalyptus (tincture, Rep.), in doses of a half or one fluid drachm twice or three times a day for a week or a fortnight, proves the more useful drug.

The Eucalyptus trees grown in Brazil and the River Plate countries are said to be less fragrant than the Australian, and to yield less aromatic oil, which is evidently owing to the richer, more clayey soil, and the moister climate.

Pomegranate Bark—Presence of an Alkaloid.—Tanret has discovered in pomegranate bark a volatile alkaloid, evidently the active principle, which, in honor of Pelletier, he has named

Pelletierina.—The bark of the stem and roots is reduced to a coarse powder, moistened with tolerably thick milk of lime, lixiviated with water, and the liquor extracted by shaking several times vigorously with chloroform. The chloroformic solution yields the alkaloid to water acidified with sulphuric, hydrochloric, nitric acid, etc., and the respective solutions will yield on evaporation in vacuo, the corresponding salts of pelletierina in crystals. The base may be isolated from the saline solution by decomposing with carbonate of potassium, agitation with ether or chloroform, and gentle evaporation of the solution. One kilogram of the dry commercial bark yielded to the author four grains of crystallized sulphate. Fresh bark would probably yield more.

Pelletierina is an oleaginous liquid, colorless when obtained in vacuo, slightly yellow when its solution is distilled in open air. A match dipped into the alkaloid burns like one saturated with a volatile oil. Its odor is slightly stupefying aromatic; it is very soluble in water, alcohol, ether, and especially in chloroform; it boils at 180° C (= 356° F.), becoming strongly colored in the air, but distils over considerably below that temperature; it has a powerful alkaline reaction; does not precipitate solutions of the alkaline earth or earths, but precipitates the solutions of most heavy metals; chloride of platinum being an exception. It has the same reactions of alkaloids with tannin, bromine-water, iodohydrargyrate of potassium, etc. Its salts are extremely hygroscopic. Evaporated in air they become colored, lose a portion of their base, and become acrid. They have a slight odor, and a bitter, aromatic taste. Ph. J. Trans., June 22d, 1878, p. 1123.

SALICARIÆ.

Lythrum Salicaria.—According to Dr. Campardon, fils, an infusion of the leaves is a popular remedy for dysentery among the peasants in the environs of Lyons. The author had an extract and a tincture prepared from a quantity of the leaves, and found them to be of service in dysentery, acute and chronic diarrhœa, etc. Their action is astringent and tonic. New Rem., April, 1878, p. 118; from Bull. Gen. de Therap. 1878.

TAMARISCINEÆ.

Tamarisk Galls.—E. M. Holmes describes these small galls, which came to Liverpool from Mogadore. They vary in size from that of a pea to a horsebean, or more rarely reach the size of a small nut. The taste is powerfully astringent. Internally they are found to be full of small cavities, in which, however, the insect that forms them is very rarely found in a state to be examined. So far as the author is aware, the name of the insect has not yet been determined. The galls contain about 40 per cent. of pure tannin. In Morocco these galls are known under the name of *Tacout*, and are produced upon the twigs of *Tamarix articulata*, Vahl. In India similar galls are produced upon *T. gallica*, L., and *T. orientalis*, Vahl.; those of the former plant are usually rather larger, and are called Bara-mai in Hindostanee; the smaller ones from *T. orientalis*, being called Chota-mai. The tamarisk galls of India also occasionally find their way into English commerce, and if better known would probably be largely used for tannin purposes. Ph. J. Trans., Nov. 10th, 1877, p. 362.

ROSACEÆ.

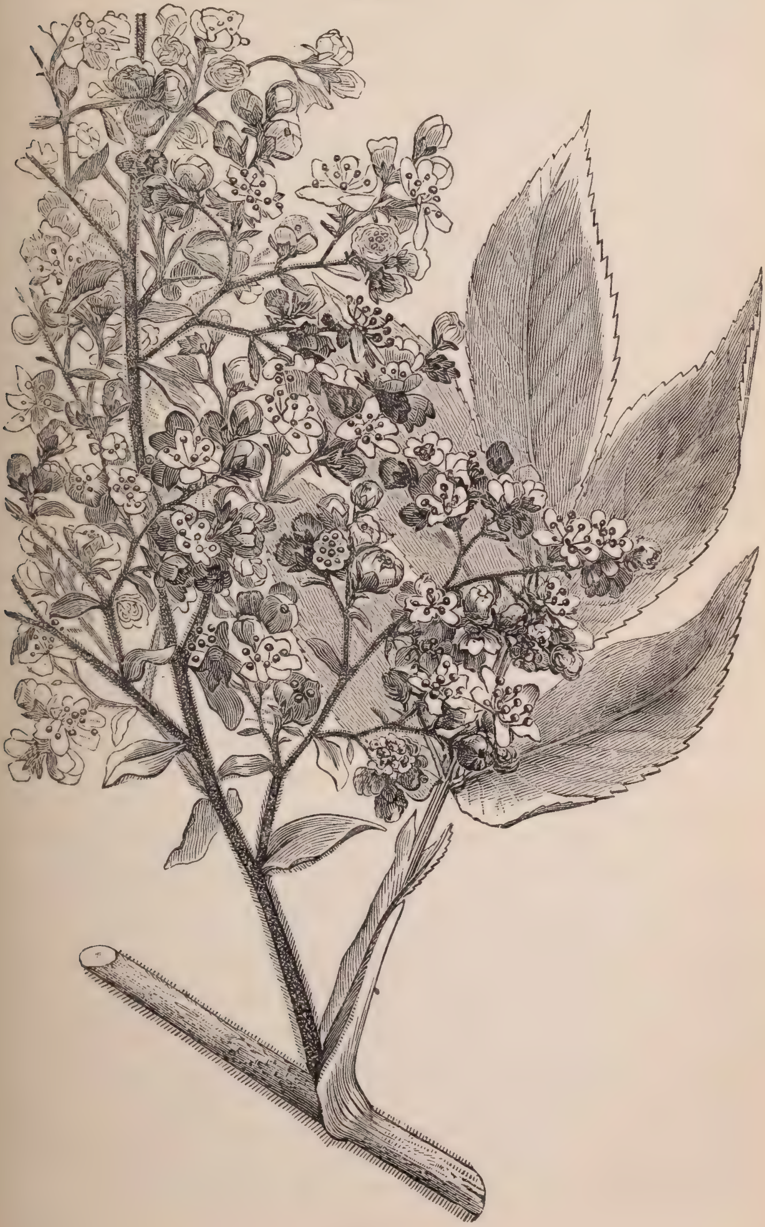
Roses in India.—J. Douglass communicates to the "Gardener's Chronicle" some interesting notes on Indian roses and their products. The ancient literature of India does not mention the rose, and its names in the modern languages of the country prove that the natives became acquainted with it much later than their neighbors of Persia and Arabia. In India rose culture is confined chiefly to the districts along the Ganges, and is especially vigorous in the environs of Ghazipore; but the greater part of the large quantities of rose oil consumed in Western and Northern India is imported to Bombay from Persia, whence, and from Arabia, the art of preparing these products was first introduced. In Cashmere, also, roses are largely cultivated, and the manufacture of their products is a very general branch of industry. They flourish up to an elevation of 5850 feet, while in Sikkim they will reach an altitude of 7800 feet, and in Thibet they are found in situations as much as 14,685 and 15,112 feet above the level of the sea.

The methods of obtaining rose water and rose oil in India are often of a very primitive character. The petals are distilled in clay or metal retorts, the latter of a capacity of upwards of 100 pounds, and the vapor is condensed during its passage through bamboo pipes. About one-third of the vapor is lost, and consequently 1 lb. roses does not yield more than its weight of water. The methods of obtaining the rose oil are equally crude. One method consists in preparing a strong rose water by distilling rose water a second time with fresh roses, and then exposing this strong water to a crude process of refrigeration by placing shallow vessels containing it in holes in the ground, previously well saturated with water, allowing the vessels to remain over night and then skimming off their layers of oil by means of a feather. Another method of preparing oil is to place layers of oiled cotton, or, better still, of oleaginous seeds, such as those of sesame, between thick layers of roses, and then to bruise and express the mass. The oil so obtained, though very fragrant, contains very little of the pure attar. Indeed, it appears that very little pure attar of roses is sold in India. The dark varieties of roses are generally cultivated, *R. Indica* and *R. centifolia* being the favorite sorts. 10 to 12 lbs. of roses are required to produce 152 grs. of pure oil. The roses are, at Ghazipore, in bloom from the end of February to about the second week in April. Ph. J. Trans., April, 1878, p. 811.

Bitter Almonds—Physiological Investigations.—The investigations of Portes lead to the following results: 1. The developing bitter almonds contain amygdalin. 2. Their composition always differs from that of sweet almonds. 3. The embryo contains the emulsin. 4. The amygdalin, whose origin is still unknown, appears first in the integuments of the seed; and 5, passes gradually through the radicle into the cotyledons. A. J. Ph., Feb. 1878, p. 70; from Compt. Rend. lxxxv, 81.

Kousso.—A description of the drug, accompanied by the handsome cut, Fig. 58, is given in "New Rem." (May, 1878, p. 137).

FIG. 58.



Kousso.

The tree furnishing the Kousso is a handsome one, and is found throughout the entire table-land of Abyssinia, at an elevation of 3000 to 8000 feet above the level of the sea. It is remarkable for its abundant foliage and fine panicles of flowers, and is generally planted about the Abyssinian villages. The flowers grow in broad panicles, 10 to 12 inches in length. They are unisexual, but, though male and female occur on the same tree, the latter are chiefly collected. The panicles are either loosely dried, often including a portion of stalk and sometimes a leaf, or they are made into cylindrical rolls, kept in shape by transverse ligatures. Very often the panicles arrive quite broken up, and with the flowers in a fragmentary state. They have an herby, somewhat tea-like smell, and a bitterish acid taste. As seen in commerce, Kousso has a light-brown hue, with a reddish tinge in the case of the female flowers. It is brought to England by way of Aden or Bombay; occasionally it reaches Leghorn, probably carried thither directly from Egypt.

LEGUMINOSÆ.

Balsam of Peru—Collection.—Theophill Wyss, apothecary at San Miguel La Union, Guatemala, has had opportunity to visit the so-called "Balsam Coast," and has witnessed the collection of Balsam of Peru. The details given in his letter to Prof. F. A. Flückiger, agree in the main very closely with those contained in "Pharmacographia," and may be accepted as additional evidence of the careful research of the authors of the last-named work. The article is accompanied by a carefully executed map of the route travelled by Mr. Wyss, and supplemented by some comments by Prof. Flückiger.

After describing the route travelled over, the locality in which the trees are found, which remind him in their general appearance of European walnut trees, and are restricted to a comparatively small district (embracing eight Indian villages or towns),* the author relates the method pursued in the collection of the balsam, which, while it agrees well with that given in "Pharmacographia," merits a place in this report: The tree first produces abundantly when it is about twenty-five to thirty years old (the period of its first flowering). It yields balsam during the entire year, but most abundantly in the dry season—from December to June. The color of the juice varies with the age of the tree, being greenish yellow when young, and becoming more chestnut-brown as they grow older. The leaves contain an aromatic oil, the seeds a yellowish resin, which, when extracted by alcohol, is sold by the apothecaries under the name of *balsamito*, or *balsamo catolico*. When the harvest begins (in December) the trees are prepared by beating their bark in twenty to thirty places the size of one to three hands with the back of an axe-like instrument, until the bark becomes soft. After eight days the bark is removed from these places by cutting, and the exposed surface is covered with rags, which absorb the juice as it exudes. They are allowed to remain eight days, when their place is supplied with fresh rags. At the end of another eight days these are removed and the wounded places are now subjected to fire *for several minutes*, for which purpose a kind of cane, very rich in resin, is used. The process of applying the rags is then repeated as before, and they are changed every eight days, until about April, when the wounded places are subjected to a second burning. The burning, or more properly scorching, causes an increased flow of balsam, which before the first burning also is yellowish and impure, while thereafter it flows out purer and in the form of a blackish oil. The balsam is removed from the saturated rags first by boiling a quarter to a half hour in water, then by expression similar to that of wringing out clothes. The latter is added to the first obtained by boiling with water, and after being allowed to settle and after removing the coarser impurities it is called "*balsamo bruto*." This is transferred to gourds, which are afterwards enveloped in plantain leaves. When the balsam is very impure it must be purified, allowing it to settle in large vessels, skimming, etc. (this constitutes the "purificacion cruda"), or the balsam is boiled without the addition of water and under continuous stirring, and the impurities are removed by skimming (this being called "purificacion à fuego"). The balsam obtained in the manner above explained is called "*Balsamo de Trapo*" (rag balsam), to distinguish it from the balsam obtained by chopping up the bark, boiling it with water, and purifying the product by one of the processes above mentioned. This latter balsam is called "*Balsamo de Cascara*" (bark balsam), and is inferior to the rag balsam, and although the yield is more abundant, is not popular. The author expresses the opinion that the balsam is already adulterated in the country of its production, but this Prof. Flückiger, in the above-mentioned comments, is disposed to doubt. Schweiz. Wochenschr. f. Ph., June 21st, 1878, p. 219.

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* This small district is embraced in the square formed by the port of Acujutla, the towns of Isalco and New San Salvador, and the port of La Libertad. The balsam is not collected immediately on the coast, but in the mountainous region embraced by the district. In "Pharmacographia" nine towns or villages are enumerated as being embraced by the "Balsam District."

Spurious Balsam of Tolu.—W. A. H. Naylor has examined an article sold in good faith by an English firm as Balsam of Tolu, which proves to be a spurious article. The circumstances under which this spurious article was vended are such as may occur again, and the author therefore communicates his observations, in order that pharmacists may be cautioned against making such purchase, as well as to supply means of distinguishing between the genuine and the substitute.

The spurious balsam when seen in bulk is yellowish-brown in color. In thin layers it is perfectly transparent and of a golden yellow. It is extremely viscid, hardens but little by keeping, and does not become brittle when exposed for some days to 100° C. (= 212° F.); odor not balsamic, but reminding of glue, and more strongly developed on warming; taste not perceptible at first, producing after a short time a sensation of warmth and acridity. In thin layers and after exposure for 3 or 4 hours to a temperature of 90° C. (= 198° F.) it gives no evidence of crystalline matter when viewed under the microscope. It is completely soluble in bisulphide of carbon, benzol, chloroform, and ether; glacial acetic acid and potash solution partially dissolve it; boiling alcohol dissolves it completely, but the solution deposits in cooling. The ethereal and alcoholic solutions have a distinct acid reaction. The balsam melts at 58° C. (= 135.4° F.). Strong hydrochloric and nitric acids produce no apparent effect upon it in the cold. Strong sulphuric acid produces a cherry-red color. When treated repeatedly with boiling water, filtered hot, the filtrate remained clear, had a neutral reaction, and when evaporated left no residue. Distilled with a mixture of bichromate of potassium and sulphuric acid, no oily liquid passed over, and no odor of oil of bitter almonds was evolved. It contains no constituents volatile at a temperature of 160° C. (= 320° F.). It appears to be composed mainly of two acid resins and an indifferent resin. Every attempt was made to identify this spurious balsam by comparing it with resinous bodies known to be employed in medicine or the arts, but without success. That it is not a commixture of two or more resinous substances, artificially prepared, may be inferred from its uniform behavior towards solvents; the persistent and unchangeable character of its odor when heated, and the constancy of the melting-points of the fractions, which is 55° C. (= 131° F.), for one of the acid resins (the other the author failed to determine), and 63° C. (= 145.4° F.) for the indifferent resin. The author therefore suggests the probability that this substance is a natural product of new importation, and not a tampered or manufactured article. Ph. J. Trans., Feb. 9th, 1877, p. 624.

Copaiba—Examination of Commercial Specimens.—Charles A. Bowman discusses the natural causes of the different appearance of commercial copaiba, which are found in its being obtained from different species of Copaifera, in the probable mixture of the product of different species, and in the loss or oxidation of the volatile oil from exposure. The principal varieties used in the United States are Maracaibo and Para copaiba, the former of which is thicker than the last. *Para copaiba* yielded a clear solution with a small quantity of absolute alcohol, and a slight flocculent precipitate with a large quantity. With little alcohol, sp. gr. 817, a separation in two layers took place; but with a large amount no separation occurred, and the solution was nearly clear. Alcohol, sp. gr. 835, gave in all proportions two layers, the lower of which was transparent, the upper cloudy. Agitated with half its volume of ammonia, a perfectly clear solution was obtained. On evaporating a little from paper, a resinous spot without greasy margin was obtained, and when evaporated in a capsule 44.4 per cent. of a hard resin was left.

Maracaibo copaibas behaved differently; they were cloudy and without flocculent separation with absolute alcohol; milky and without separation with little alcohol, sp. gr. 817, and cloudy with more. They separated into two layers with alcohol, sp. gr. 835, gave a permanent milky mixture with half the bulk of ammonia, left on paper a resinous stain with greasy margin, and on evaporation from a capsule a plastic or soft residue.

Para copaiba formed a clear solution with petroleum benzin until about 8 parts of the solvent had been added, when some floccules separated; the Maracaibo copaibas gave clear solutions. Some experiments were also made, and the results are described, with Para copaiba adulterated with 30 per cent. of castor oil, with the same amount of linseed oil, and with 20 to 50 per cent. of

Venice turpentine. The author is convinced that the presence of Venice turpentine, and not only the presence, but also very nearly the percentage of castor oil, may be detected by the proper application of petroleum benzin. Experiments made with acids, oxidizing agents, various chemicals and solvents, failed to afford a reliable test for purity other than that above given. A. J. Ph., Aug. 1877, p. 385.

Copaiba.—Jos. Fulton reports having examined seven commercial specimens of copaiba, which he found free from the adulterations sometimes met with in the drug, such as turpentine, gurjun balsam, castor and other fixed oils. The first two mentioned in the table below were incompletely soluble in a small quantity of absolute alcohol, the remainder dissolved readily therein. On being boiled with water the first four left as residues a hard, the other a more soft resin; the other results are tabulated as follow:

	31 grams yielded on distillation			Number of drops in		Drops of vol. oil in	Solidified with
Spec. Grav.	Vol. oil.	Resin.	Loss.	30 cc.	1 gram.	20 drops Copaiba.	Magnesia.
.937	21.7	8.5	.8	912	22	22⅓	not
.938	20.	8.7	2.3	880	22	20⅔	not
.950	17.	12.7	1.3	832	21	18⅓	in 10 days
.950	17.5	12.8	.7	816	20	19⅔	" 12 "
.957	11.	18.5	1.5	744	20	12½	" 3 "
.960	9.5	20.	1.5	720	19	12½	" 2 "
.970	9.	20.3	1.7	680	20	10	" 2 "

The copaiba was dropped from a minim measure; 1 gram oil of copaiba yields 35 drops. A. J. Ph., Nov. 1877, p. 550.

Copaiba-Testing.—L. Siebold reviews the various tests that have been proposed for testing copaiba, and finds many of them, among which some are still recommended, to be quite unreliable. The sp. gr. can not be relied on, because copaiba will vary within the limits of 0.95 and 0.995. The *appearance*, *color*, *greater or less limpidity*, the *proportions of resin and oil*, are all very variable, and form no correct basis for judgment. The *benzol test*, given in the B. P., is useless, because all known adulterants for copaiba are soluble in benzol. The *magnesia test*, depending on the alleged solubility of 1 p. of carbonate of magnesia in 4 parts of copaiba by the aid of heat, and remaining clear, is quite fallacious, because it answers only with the thicker specimens of Maranham copaiba. The *ammonia test*—solution of 1 p. copaiba in 2½ to 3 p. ammonia water, and formation of a clear solution—is equally fallacious and for the same reasons as the magnesia test. The *alcohol* *test*—depending on the alleged complete solubility of copaiba in "rectified spirit," is not reliable, because the solubility of copaiba is true only for certain kinds, the great majority of samples of copaiba not being soluble in that menstruum. Most copaibas, however, form a clear solution with 3 volumes of "absolute alcohol;" though the thinner varieties, especially those of Para, form cloudy mixtures. *Muter's test* (see Proceedings, 1877, p. 216) is also not sufficiently delicate for the detection of fixed oils; 5 per cent. of linseed oil, for instance, is not indicated at all, and even 10 per cent. gives but indistinct results. The test that the author finds best adapted for the detection of fixed oils, which is at once simple and delicate enough to detect 1 per cent. while it admits of a rough calculation of the amount of adulteration, is that of

Evaporation.—About 1 to 1.5 gram of copaiba is heated on a watch-glass until all the oil is driven off, which is the case so soon as the residue assumes a rich brown color. A few minutes suffice for the experiments. If the remaining resin is perfectly brittle and pulverizable, there is no fatty oil present, for 1 per cent. of oil would diminish the brittleness of the resin so that it cannot be reduced to a fine powder. With large quantities of the adulterant (3 to 5 per cent), the resin feels quite sticky. On heating the resin, castor oil and linseed oil may be distinguished by the odor. By mixing the adulterated copaiba with 10, 20, 30, 40 and 50 volumes of pure Maranham copaiba respectively, and testing each dilution in the manner described, it is easy to find in which the oil has been reduced below 1 per cent. and the quantity of adulterant is thus ascertained. For the detection of "*Gurjun Balsam*," the author recommends the test of Flückiger (given in "Pharmacographia"), with bisulphide of carbon and a mixture of nitric acid and sulphuric acids; and also Hager's test (see Proceedings, 1876, p. 191) with petroleum ether.

Oil of turpentine is best detected by distilling a portion of the copaiba and collecting the first portions of the distillate separately. Oil of turpentine boiling at about 160° C. (= 320° F.), while oil of copaiba boils at 240°–250° C. (= 474°–492° F.), the former passes over first and is evidenced by its odor when a few drops of the first distillate are heated on a watch-glass. 2½ per cent. of the adulterant may thus be detected. Yearbook of Ph., 1877, p. 601–605.

Indigo—Culture and Preparation in Pondicherry.—J. Dépierre has communicated (Bullet. de la Soc. Industr. de Rouen, 1876, p. 434) an interesting paper on the culture and preparation of indigo in Pondicherry and on the coast of Coromandel. The plantations are situated on high declines, which receive moisture only from the rain. The rich soil is cultivated just before the rainy season sets in. In March, when the soil is saturated with moisture to the depth of about 46 cm., the seed is planted—about 6 cm. apart—in small furrows, which are about 40 to 45 cm. apart, 1 hectare requiring about 14 kgrams of seed. The field is then again levelled, when, after 3, 4 or 5 days, the young plants begin to appear, and soon attain a height of 6 cm. The field must then be assiduously weeded until the plants have attained a height of 20 to 25 cm. The flowering period begins after 90 days, and the proper period for the first crop has then arrived (June); the second cutting is done in September, and the third in January; the plants being cut about 20 cm. above the ground. The first cutting yields an inferior quality of indigo; the second cutting yields an abundant and superior quality; while the third cutting yields a very small quantity of indigo, but its quality is very good.

The cuttings, as fast as they are received, are laid horizontally into the soaking vats, in which they are maintained under water by pressure for 18 hours, if the surrounding temperature is 35° C (= 95° F.), or 20 hours if the temperature is lower. The period of such maceration is also dependent on the greater or less maturity of the plants. The time for intercepting the fermentation is indicated, when the bubbles of gas, rising to the surface, burst immediately on their appearance, when the liquor, upon stirring, has a yellowish-green color, and when its taste is pleasant and sweetish. The liquor is then drawn off into vats, in which it is beaten with wooden paddles in the hands of men, who, to the number of 10 or 12, enter the vats perfectly naked; the beating being continued from 1½ to 3 hours, according to circumstances. By this beating the liquor acquires a light-blue, and finally dark-blue color, and considerable froth, of the same color, is formed, which, when too copious, is removed by the addition of oil of benne. When the green tint of the liquor has disappeared entirely—determined by the frequent immersion of strips of cloth attached to a string—the beating is discontinued, and the indigo is allowed to settle. The settling of the indigo is promoted, not, as at other places of its manufacture, by the addition of alkalies, sugar of lead, infusion of galls, lemon-juice, and especially lime-water, but by the addition of a decoction of *jamblon bark*.* After the indigo has settled completely, the supernatant liquor is carefully drawn off, the indigo is collected on strainers, and washed with a little water; it is then transferred to boilers, is boiled with sufficient water to give the mass a creamy consistence for 4 to 5 hours with assiduous stirring, is then allowed to cool, drained as perfectly as possible, transferred to press-bags, and expressed carefully and evenly so as to prevent the formation of cracks during the process of drying. The press-cakes, weighing 9 to 10 kilos, are cut into 7 times 7 pieces (about 200 to 210 grm. each), which are placed on drying frames (which are covered with a layer of ashes), and are dried, avoiding a current of air, at first slowly, and afterwards more rapidly; the drying process requiring about 60 days. Zeitschr. Œst. Ap. Ver., Nov. 20th, 1877, p. 536.

Logwood — Process of Fermentation. — The fermentation of chipped logwood is best accomplished as follows: For every 100 lbs. of the chips use 30 lbs. of pure soft water. The chips are spread out 3 to 5 cm. high, and water is sprinkled over them, so that they shall be equally moistened, by means of a spray apparatus. After it has been uniformly moistened, the logwood is shovelled into high piles, and allowed to remain undisturbed for 2 weeks; after which it is again spread out, moistened with 10 lbs. more of water as before, and again shovelled into heaps. After resting for 1 week more, the logwood is ready for the dyer. It is to be observed that the process is not conducted in situation exposed to ammoniacal vapors (near stables, sink-holes, etc.), and that the water be a truly soft water, free from lime, salts, etc. Well-water will on that account not answer. Glue-water (2 lbs. glue to 30 lbs. of water), employed in place of soft water, very materially hastens the fermentation, a few days being sufficient to fit the logwood for the dyer's use. The water must, however, be sprinkled on the chips at a temperature of 20° R. (= 77° F.), and the temperature of the locality should at no time fall below 15° R. (= 65.75° F.). Ph. Centr. H., Aug. 16th, 1877, p. 267.

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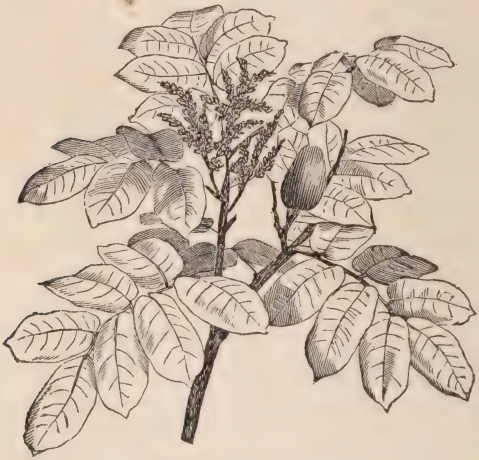
* Jamblon bark is the bark of *Syzygium Jambolanum* (N. Ord. Myrtaceæ), an East Indian tree, attaining a height of 10 meters. The bark has a dirty, light-gray color, contains about 11 per cent. of tannin, and a yellow coloring matter. A decoction is employed in India as a final bath in indigo-dyeing, the dyers believing that the color is thereby improved.

Tonka Bean (*Dipteryx Odorata*).—The tree bearing the Tonka bean is one of only eight species included in the genus, all of which are large forest trees of Brazil, Guiana, and the Mosquito coast. The tree under consideration acquires in the forests of British Guiana an average height of about 60 feet. It has alternate leaves, composed of from five to seven alternate leaflets (see Fig. 59). The flowers are borne in racemose panicles, and the fruit (Fig. 60) is of a somewhat oval form, consisting of a thick, fleshy substance, which becomes, when mature, of a hard, woody character, and incloses a long, almond-shaped, shining black seed (see Fig. 61). This seed has, as is well known, a powerful odor, resembling that of newly mown hay. The Creoles fully appreciate the fragance of these seeds, and make use of them not only for their perfume, but also for putting in chests and drawers, for the purpose, they say, of driving away insects. A closely-allied species, namely

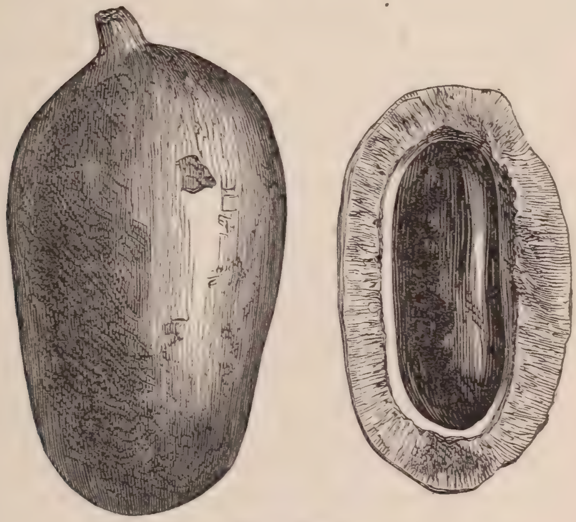
Fig. 59.



Dipteryx odorata.

Dipteryx eboensis, a native of the Mosquito country, bears a fruit and seed almost identical in appearance with those of *D. odorata*. It has, however, no perfume, but contains a quantity of thick oil or fat, which is extracted by the natives, and used as a hair oil. It was at one time said that this oil formed the basis of a much-advertised hair-restorer, known as "Balm of Columbia." New Rem., Jan. 1878, p. 7; from "The Garden."

FIGS. 60, 61.



Tonka Bean.

Calabar Bean—Alkaloids.—Harnack and Witkewsky have investigated the subject of the alkaloids of calabar bean, and ascertained that the seed contains two alkaloids, one of which acts like strychnia, while the second, heretofore known as *physostigmia*, has a paralyzing effect. The new alkaloid, which they have named *calabarina*, is insoluble in ether, soluble in alcohol, and more freely soluble in water than the former; its precipitate with mercuro-potassium iodide is insoluble in alcohol. The calabar preparations of commerce are often mixtures of the two alkaloids in varying proportions, hence their effect must vary considerably; an English preparation was found to be almost free from physostigmia, while Duquesnel's *eserin* appears not to contain any calabarina. Physostigmia has a tendency to change into Duquesnel's *rubreserin*, particularly under the influence of alkalies; the latter body, however, is insoluble in ether; an ethereal extract seems, therefore, preferable to one made with alcohol. This is, however, denied by O. Hesse, since physostigmia in its natural combination is nearly insoluble in ether. The latter also refers to the difficulty of recognizing the purity of physostigmia, which is amorphous even if obtained by Vée's process (1865); what the latter regarded as crystallized eserina was most likely a body similar to cholesterin, still containing some alkaloid. Hesse has recently isolated this body and found it to crystallize from ether, chloroform, and petroleum ether, in white silky needles, which are indifferent, and fuse at about 133° C (= 271.4° F.). A. J. Ph., Sept. 1877, from Schweiz. Wochenschr., 1877.

Araroba—Botanical Source.—Dr. Rameiro A. Monteiro, who has recently visited the district in which the tree furnishing the araroba is met with, has supplied some notes to the "Journal de Thérapeutique." The tree is known in all the places where the extraction of araroba is carried on under the name "*angelim amargoso*," or "bitter angelim." Why it is called "angelim" is unknown. It is a neighbor of another tree, which yields a product having vermifuge properties, the *Andira anthelmintica*, Benth. (*Geoffroya vermifuga*, St. Hil.), from which, however, it differs in appearance, although both belong to the Leguminosæ. The term bitter is applied to it because its wood is bitter, like cinchona, and persons who cut down the trees are sensible of a bitter taste, which is due to particles which become detached from the inner layers of the wood. There is also an "*angelim doce*" (*Andira vermifuga*, Martius), and an "*angelim pedra*" (*Andira spectabilis*, Sald.), which also belong to the Leguminosæ. The powder obtained from the bitter angelim is invariably called "araroba." The tree is met in great abundance in the forests of Camanu, Igrapiuna, Santarem, Taperoa, and Valença, in the province of Bahia. It appears to prefer low and humid spots, but it is also met with in the more elevated regions where these are not very arid. It is one of the tallest trees in the forests in the south of the province, is erect, smooth, and when fully developed it measures 1 to 2 meters in diameter, and 20 to 30 meters from the ground to the small branches. Dr. Rameiro did not ascertain the exact period of the year when the bitter angelim flowers, but he learned that the flower is dark purple and the fruit is a pod. The tree is not cultivated.

The araroba is found and collected at any convenient period of the year, and is contained in clefts or cavities, more or less narrow, in the wood. The clefts traverse the wood in the direction of the diameter, and are prolonged through the whole extent of the trunk, becoming narrower toward the upper part. Sometimes small clefts also occur parallel with the primary ones. In order to extract the araroba it is the practice to hew down the tree, cut it into small sections, and split them longitudinally, which is favored by the fibre of the wood—and the large clefts, upon the surface of which the araroba is deposited, and is scraped off by the workmen with the sharp edge of an axe. Commercial araroba is therefore very impure, as it is mixed with a considerable quantity of ligneous particles. The araroba is a yellow powder, comparable to powdered sulphur, though a little darker and devoid of lustre. By the action of the atmosphere it loses little by little its fine color, becomes darker, and finally takes a deep purple color. The workmen employed in the extraction of araroba suffer from irritation of the conjunctiva, which sometimes passes into inflammation of that membrane.

It is quite certain that araroba is not found in the medulla, as has been generally supposed, but is deposited as a concretion in the clefts before mentioned. Ph. J. Trans., June 29th, 1878, p. 1048; from Rép. de Pharm.

Charles Bullock contributes a *résumé* of what has been already published on Goa powder and chrysophanic acid, and much of which has been noticed in previous reports. See A. J. Ph., Nov. 1877, p. 545.

TEREBINTHACEÆ.

Japan Vegetable Wax.—The most important article in Japan for illuminating purposes is the candle made of vegetable wax, which is mostly composed of palmitin. It is produced from the fruit of several trees belonging to the genus Rhus, amongst which the *Rhus succedanea* is the most important, and is grown amongst vegetables, more or less extensively, almost everywhere in Japan, especially in the western provinces, from the south northwards to the thirty-fifth degree. The lacquerine (*R. vernicifera*) also yields wax, and differs in appearance but little from the wax tree. Its geographical limit extends further northward, being at the thirty-ninth degree. Finally, the *Rhus sylvestris*, or wild wax, should be mentioned. The cultivated wax tree was originally imported from the Loo Choo Islands, but the growers of the tree now distinguish seven different varieties. The berries, which ripen in October and November, are the size of a small pea, united in small bunches, and contain the wax between the kernels and outer skin. They are gathered, exposed to the sun for a few days and stored in straw. When properly matured, they are freed from stems by thrashing with flails of bamboo; are crushed, winnowed, steamed, placed in hemp cloth bags, steamed again, and pressed in a wooden wedge press, all by hand. In order to facilitate the flow of the wax a small percentage of the oil from *Perilla ocimoides*, Lin. ("Ye no abura") is added. The raw product forms upon cooling a coarse, greenish, tallowy mass, which is placed in earthen vessels with water and ashes. The yield is about 15 per cent. (see Proceedings, 1876, p. 193). The paper also embraces a description of the method of making candles, and gives statistics of the exports, etc., of the wax. A. J. Ph., Sept. 1877, p. 452.

Pistacia Terebinthus.—According to X. Landerer, a strong decoction of the leaves of this tree has been found very useful in albuminaria, and he has known a patient whose urine was so much loaded with albumen as to give quite a consistent milk on the addition of nitric acid, to yield so promptly to the use of the above-named decoction, that after several weeks' persistent use the urine did not show even a trace of albumen. *Pistacia terebinthus* yields by incision chian turpentine; it must not be confounded with *P. lentiscus*, which yields mastic, nor with *P. vera*, which yields the pistachio nuts of the confectioners. A. J. Ph., April, 1878, p. 175.

Luban Mati and Olibanum.—In the course of the investigations intended for working out the "Pharmacographia," Messrs. Flückiger and Hanbury were led to the conviction, as stated there (pp. 121, 131, and 135), that the *Elemi* of the mediæval writers agreed with the old gum of the "Ethiopian Olive," and that under the latter name not an *Olea*, but *Boswellia Frereana*, Birdwood, is to be understood. Although it is impossible to prove absolutely the correctness of this view, it was especially the firm belief of the late Mr. Hanbury that the *Luban Meyeti* or *Mati*, as described in "Pharmacographia" (p. 135), was the drug originally designated Elemi. Prof. Flückiger now adds, that he has no new facts to present in support of that opinion, but that they had repeatedly considered the question and never met with any statement which would be in contradiction with their suggestion. The facts which guided the authors in their opinion are now presented in the form of a rather lengthy paper by Prof. Flückiger, to which the reader is referred (see Ph. J. Trans., April 13th, 1877, p. 805–808).

PIPERACEÆ.

Cubebs—Constituents.—A number of years ago, E. Schmidt had communicated to "Arch. Ph." (v. 191, p. 1), the results of his investigations upon the constituents of cubebs. Among these he had subjected the stearoptene—cubeb camphor—which is deposited from the volatile oil by age, to thorough examination, and proved, as the result of several analyses, that its ultimate composition corresponded to the formula $C_{15}H_{26}O = C_{15}H_{24} + H_2O$ ($O = 16$), and that it is, therefore, to be regarded as a hydrate of the volatile oil of cubebs. Subsequent experiments of Schaer and Wyss have substantiated the results of the author, not only in reference to its ultimate composition, but also in reference to its melting-point, which he found to be 66.5° C. (= 151.7° F.), while S. and W. found it to be 67° C. (= 152.6° F.). Recently, however, Jobst and Hesse have thrown some doubts upon these results, and, believing cubeb camphor to be isomeric with the *Echicerin* isolated by them from dita bark (see Proceedings, 1876, p. 137), have attributed the formula $C_{15}H_{24}O$ ($O = 16$), indicating that it is a product of oxidation. The author has, therefore, again subjected this body to examination, and finds that his former results were correct in every particular. He has, furthermore, found, that cubeb camphor may be split into volatile oil and water when it is subjected to a temperature of 200°–250° C. (= 392°–482° F.), and that the conversion occurs, partially, by simple distillations of the camphor, and even at common temperatures when this body is exposed for some time over sulphuric acid, or when it is exposed for several weeks to the vacuum of an air-pump.

In connection with these investigations, the author has also repeated his analysis of *cubebin*, which he had characterized as a crystallizable resin, and to which he had attributed the formula $C_{33}H_{34}O_{10}$ ($O = 16$). His recent analyses have yielded a mean increase of 0.5 per cent. of carbon, and agree, therefore, more closely with the results of Heldt, who had assigned to cubebin the formula $C_{30}H_{30}O_9$ ($O = 16$). Cubebin may, therefore, be regarded as a simple product of the oxidation of the volatile oil, according to the following equation: $2C_{15}H_{24} + 18O = 9H_2O + C_{30}H_{30}O_9$ ($O = 16$). Arch. Ph., July, 1877, p. 34.

Cubebs.—Louis F. Griffin has found that light petroleum benzin (gasolin) dissolves from powdered cubebs 16.5 per cent. of oil and resin, while wax and cubebin are insoluble therein; gasolin would, therefore, appear to be adapted for preparing an active oleo-resin of cubebs. The residue left after preparing the tincture of cubebs from four troy ounces of powder yielded to gasolin 115 grains of oleo-resin, and the two pints of tincture can, therefore, only contain 200 grains of the oleo-resin. Spirit of nitrous ether, which is used in Mettauer's tincture of cubebs, exhausts it thoroughly. A. J. Ph., Nov. 1877, p. 552.

CELASTRACEÆ.

Add-Add.—Prof. Dragendorff has examined an Abyssinian drug, called "add-add," which is composed of the leaves of a tree belonging to the Celastraceæ, the

Celastrus Obscurus.—The plant abounds in all the highlands of Abyssinia, at a height of 8000 to 10,000 feet, and does not occur below 8000. Certain Celastraceæ shrubs occur, however, at an elevation of from 4000 to 7000 feet, also designated by the name "add-add," but they do not possess the activity of C. obscurus. The leaves, as obtained by the author, are oval, rounded, or notched above, somewhat attenuated at the petiole. The petiole is woody, 0.7 to 0.8 cm. long, the laminæ leathery, 3 to 6 cm. long, 2 to 3.5 cm. broad, in young specimens spread out flat, in older ones folded towards the midrib, and owing to a lateral bend in the latter, somewhat crooked. Under the microscope neither oil-glands, nor on the under side, any hairs are visible. The edges of the leaves are finely notched and the surface is veined netlike, the whitish midrib being somewhat prominent on the under surface. The dry leaf has a light-green to brownish-green color, and the powder resembles that of sumach leaves. The taste is astringent-bitter; the odor reminds of black tea. The drug enjoys a high reputation and is regarded superior to quinia in the treatment of malarial diseases, particularly in that designated by the name of "kolla" disease.

By a course of analysis which cannot be particularized here, the author obtained the following results: Moisture, 5.60; ash, 5.71; sand, 1.07; albumen, 0.87; other albuminoid substances, 7.82 (total nitrogen = 1.4 per cent.); cellulose, 16.44; fibrose, vasculose, lignin, 16.34; pararabin, 0.95; pectin, 3.18; mucilage, soluble in water, 8.48; volatile oil, 3.08; fat, 3.83; resin and chlorophyll, 2.64; phlobapen, 0.57; tannic acid, 11.91; bitter principle (celastrin, etc.). 5.11; tartaric acid, etc., 2.43; oxalic acid (as calcium salt), 1.32; = 100 parts.

Among all of these substances only the tannic acid, the volatile oil and the bitter principles can have the medicinal action attributed to Celastrus obscurus. But none of these appear to be calculated to produce medicinal effects that should warrant the introduction of "add-add" into European practice. Physiological experiments have been made with each of the three substances named, but the results were not favorable. Regarding the bitter principle, *celastrin*, it is interesting to note its chemical identity with *menyanthin*, notwithstanding that the plants yielding them are botanically widely removed from each other. Arch. Ph., pp. 97, 116.

AQUIFOLIACEÆ.

Ilex Paraguayensis—Maté or Paraguay Tea.—Dr. H. Byasson having been requested by Prof. Gubler to examine a specimen of "maté," or "Paraguay tea," has recently presented to the Paris Academy of Medicine a note containing a *résumé* of the principal facts previously known respecting this product, together with some observations as to its chemical composition.

Maté constitutes, throughout South America, the favorite drink of the inhabitants, who attribute to it innumerable virtues. The word "maté" originally designated the vessel in which the infusion was prepared. The maté tree is known as the *Arvore do Congonha.* The tea itself is sold under three different names, each indicating a commercial variety.

(1.) *Caa-Cuyo* ("caa" signifies a leaf): consisting of buds scarcely expanded. It is consumed in the locality where gathered.

(2.) *Caa-Miri:* prepared by the Jesuits from the dried leaves, carefully cleaned and powdered.

(3.) *Caa-Gazu:* prepared by the natives from the leaves, roasted and coarsely powdered. This was the variety examined by the author. It contained also fragments of the petioles and young shoots. The powder was greenish yellow and had a slightly aromatic odor, which was developed by contact with water.

100 grams of this maté were mixed with 25 grams of slacked lime into a paste and the mixture slowly dried in a stove at 75° C. (= 167° F.). It was then exhausted successively with (1) 600 cc. of chloroform; (2) 600 cc. of 95° alcohol; and (3) suffi-

cient water to remove the alcohol as much as possible. In the chloroformic solution (1) he determines the presence of 1.850 grams of *caffeia.* He also extracted from this portion, after the removal of the caffeia, 3.870 grams of *a glutinous substance, or peculiar fatty matter and coloring matter.* In the alcoholic liquor he determined the presence of 2.380 grams of *a complex glucoside,* which was nearly white, amorphous, and of aromatic odor, but presented none of the characters attributed to caffetannic acid and attributed to maté by Rochleder. It also contains 0.630 gram of *resin.* 100 grams of maté, exhausted by a liter of boiling distilled water, yielded 24 grams of dry extract. The precipitate produced in aqueous infusions by acetate of lead, when purified by appropriate means, proved to be composed of malate of lead, but the quantity of malic acid contained in the drug was not determined. On incinerating the extract a proportion of ash equal to 3.92 per cent. of the maté used was obtained. The ash contained carbonate of potassium, was rich in sulphuric acid, and contained iron in weighable quantities. The result shows that the amount of caffeia in the Paraguay tea analyzed by the author is comparable with that in the kinds of coffee or tea richest in that alkaloid. Ph. J. Trans., Feb. 2d, 1878, p. 605.

P. N. Arata finds that when the liquid obtained by exhausting Paraguay tea with ether, or better, with ether-alcohol, is treated with lime, filtered and evaporated, it leaves a fatty residue, resembling *wax.* It was freed from chlorophyll by treating its ethereal solution with animal charcoal. The ethereal solution was then agitated with water, to remove caffeia and other substances, and on evaporation left pure waxy matter. When boiled with an aqueous solution of hydrate of potassium this wax was partly dissolved, leaving a residue soluble in ether, and much more butyraceous than the original substance. This was separated by treatment with alcohol into an insoluble portion, transparent and of a yellow color, and asoluble portion, which is whitand melts at 55° C. (= 131° F.). On neutralizing the alkaline solution obtained by the saponification of the wax with hydrochloric acid, a white precipitate is produced which has acid properties and is soluble in ether and in boiling alcohol. It melts at 105° to 110° C. (= 221° to 230° F.), and has a density of 0.8151 at 26° C. (= 78.8° F.). From the results of the analyses it does not appear to belong to the acetic series, but its molecular weight is very high. The author proposes to name the acid *mateceric acid.* Ph. J. Trans., May 4th, 1878, p. 868; from Gazz. Chim. Italiana.

Ilex Paraguayensis—Proximate Examination.—Alonzo Robbins has had opportunity to examine seven authentic samples of maté (Yerba Maté, or Paraguay Tea), exhibited at the Centennial Exhibition, and reports the result in Am. Jour. Pharm. (June, 1878, p. 273 to 282). Prefacing his paper—which is illustrated by the handsome cut, Fig. 62—by some general remarks on the Centennial Exhibit, and giving Dr. Mantegazza's statement of the method of preparing maté (see Proceedings, 1877, p. 221), the author proceeds to give the following description of the samples examined by him:

No. 1. Exhibited by M. Vera; packed in bag made of wolfskin, weight about 4 kilos, color bright greenish-yellow, odor not as aromatic as some of the other examples, almost entirely free from twigs, and appears to have been prepared from very young leaves dried with little if any artificial heat.

No. 2. Exhibited by T. B. Appleyard; size of package and general appearance and character of this sample very much like No. 1.

No. 3. Exhibited by I. Arrillaga; weight about 8 kilos, packed in the entire skin of a tapir; this maté was rather coarse, containing many twigs, some of which were charred slightly; color dull brownish green, odor very aromatic and balsamic. This sample is believed to have been prepared by the Guarani Indians of the northern part of the Missions.

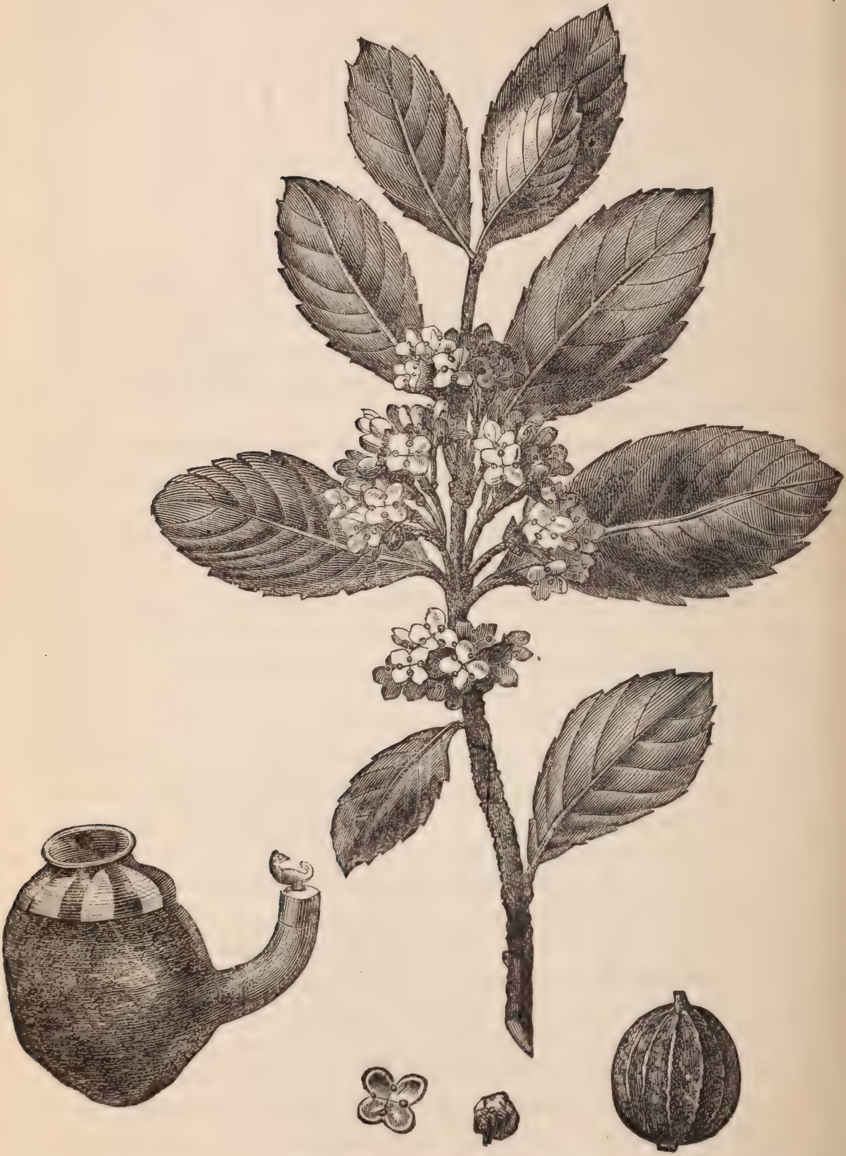
No. 4. Exhibited by the Provincial Commission (of the Argentine Republic); weight 15 kilos, packed in the entire skin of a tapir; general appearance and character of this sample like No. 3.

No. 5. Exhibited by the Provincial Commission; weight 10 kilos, packed in the entire skin of an animal. This sample was very unevenly powdered, and much of it quite coarse; it also contained a large proportion of twigs somewhat charred, and much sand; in color it resembled No. 4; the odor was also similar to that sample, but much weaker; its general appearance indicated the most primitive mode of preparation. This sample was from the department of Italy on the Parana.

No. 6. Exhibited by the Provincial Commission; packed in a small skin bag, weighing 3 kilos; this maté was coarsely powdered, very dark in color, odor quite aromatic and balsamic, and contained many fruits and twigs. It was from Italy.

No. 7. Exhibited by the Provincial Commission; packed in skin bag, weighing 65 kilos. This maté was finely powdered, of

FIG. 62.



Maté; branch of Ilex Paraguayensis.

a bright color, aromatic odor, and contained only a small proportion of twigs; it was from the northern part of the territory of the Missions, which furnishes the most celebrated maté. This territory is formed by that part of the extinct empire of the Jesuits, which was inherited by the Argentine Republic. Among the forest trees which grow admirably in the Missions, that which produces the Yerba Maté merits a special mention. Near the river Uruguay it forms extensive forests, which are the source of a most important industry, whose principal centre is the Villa de San Xavier.

The appearance and character of the samples indicate that there are at least three sorts of powdered maté. First, that made from the young leaves (Nos. 1 and 2); second, that prepared by the original primitive method of the natives (Nos. 3, 4, 5, and 6), which exceeds both of the other kinds in aromatic properties; and third, that prepared with more care and with the aid of modern furnaces for its torrefaction, and mills for pulverization, of which No. 7 appears to be a sample.

The experiments made by the author need not be repeated here; they were made with the utmost care, and the results are shown in the three following tables; table No. 1 showing the results obtained by treating 10 grams of each of the matés to the action of solvents and by processes separately, whilst tables Nos. 2 and 3 show the results obtained by single samples of each of the matés by successive solvents:

TABLE I.

10 grams of Maté treated separately with	SAMPLES.						
	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.
Boiling Water, ...	3.37	3.65	3.52	3.17	3.09	3.31	3.16
Petroleum Benzin, . .	0.58	0.45	0.41	0.57	0.36	0.45	0.41
Chloroform, ...	0.90	0.75	0.71	0.89	0.51	0.66	0.73
Alcohol, sp. gr., .822, .	3.05	3.62	3.83	3.12	3.01	3.24	3.26
Alcohol, sp. gr., .941, .	3.49	3.77	3.84	3.23	2.98	3.33	3.36
Tannin, ...	1.55	1.60	1.60	1.60	1.28	1.00	1.30
Caffeia, ...	0.03	0.02	0.06	0.10	0.08	0.16	0.14
Total Ash, ...	0.65	0.58	0.55	0.50	1.09	0.73	0.64
Ash Soluble in Water, .	0.18	0.15	0.20	0.16	0.12	0.17	0.18
Ash Insoluble in Water,	0.47	0.44	0.35	0.34	0.94	0.56	0.47
Ash Soluble in Hbl, . .	0.36	0.40	0.32	0.31	0.53	0.44	0.40
Sand, ...	0.11	0.04	0.03	0.03	0.41	0.12	0.06
Moisture in Air-dried Maté, ...	0.75	0.85	0.80	0.75	0.62	0.75	0.71

TABLE II.

10 grams of Maté successively treated with	Samples.						
	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.
Petroleum Benzin,	0.58	0.45	0.41	0.57	0.36	0.45	0.41
Chloroform,	0.22	0.24	0.22	0.27	0.21	0.25	0.22
Alcohol, sp. gr., .822,	1.57	2.32	2.49	1.70	1.78	1.90	2.02
Alcohol, sp. gr., .941,	2.12	1.82	1.87	1.84	1.81	1.73	1.68
Boiling Water,	0.27	0.24	0.21	0.22	0.20	0.25	0.24
Ash,	0.32	0.38	0.29	0.24	0.92	0.40	0.38

TABLE III.

10 grams of Maté successively treated with	Samples.						
	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.
Boiling Water,	3.37	3.65	3.52	3.17	3.09	3.31	3.16
Petroleum Benzin,	0.59	0.50	0.53	0.61	0.40	0.43	0.46
Chloroform,	0.16	0.17	0.16	0.20	0.15	0.17	0.19
Alcohol, sp. gr., .822,	0.39	0.44	0.52	0.48	0.38	0.31	0.41
Alcohol, sp. gr., .941,	0.19	0.17	0.32	0.18	0.29	0.16	0.21
Ash,	0.36	0.36	0.31	0.28	0.92	0.44	0.40

On examining the products obtained according to Table I, the following was noted:

The extracted matter obtained with *boiling water* contained caffeia, tannin, gum, starch, and pectin.

That obtained with *petroleum benzin*, contained chlorophyll, resin, wax, and fatty matter, and probably a small quantity of volatile oil, though none could be separated; it contained no tannin or caffeia.

That obtained with *chloroform*, contained wax, fatty matter, chlorophyl, resin, and caffeia, but no tannin.

That obtained with *alcohol*, sp. gr. .822, contained fatty matter, chlorophyll, resin, tannin, and caffeia.

That obtained with *alcohol*, sp. gr. .941, contained resin, caffeia, and tannin.

The ash was not examined further than is indicated by the table; the portion insoluble in hydrochloric acid is principally sand. Owing to the mode of preparing the maté, it is rendered certain that the ash is not all from the constituents of the leaves themselves, but partly from earthy matter introduced during the process of preparation.

The author suggests the following *pharmaceutical preparation* of maté: The *simple infusion*, which is the form in which it is always used in South America; a *solid extract*, prepared with alcohol of sp. gr. .822, and a *fluid extract*, prepared with alcohol of sp. gr. 941.

EUPHORBIACEÆ.

Euphorbia Lathyris.—O. Zander has subjected the purgative seeds of this plant to an examination, chiefly in the direction of the fixed oil, which is contained in them so abundantly that the plant is occasionally cultivated, in certain parts of Germany, and the oil used for illuminating purposes. The author found the oil obtained by expression to be odorless, while that obtained by extraction with bisulphide of carbon possessed an odor of garlic or kakodyl, leading to the inference that the bisulphide exercises chemical action. The yield is 42 per cent. of clear, yellow, viscid oil. The residue yielded to alcohol a soft, acrid resin. Five drops of the oil, taken with some water, produced a burning sensation in the throat, followed by nausea and slight vertigo, after a half hour by vomiting, and after another half hour by strong and repeated purging. When rubbed several times on the skin it produced a gentle burning sensation. The oil is, therefore, poisonous, and its cultivation for illuminating purposes, notwithstanding the abundant yield, not desirable. It may, perhaps, be of sufficient therapeutic value, however, to be applied as a substitute for croton oil.

Castor-oil Seeds.—Th. Husemann makes the following remarks in regard to the poisonous effects of castor-oil seeds: "It has long been known that the seeds of *Ricinus communis* contain, besides the oil, a peculiar acrid principle, which causes violent vomiting and purging, and which must be reckoned among the acrid poisons. Van Hasselts, a number of years ago, declared one seed to be sufficient to sicken a grown person, and twenty to be sufficient to kill him." This statement was contradicted by Bernelot Moens, who suspected that the seeds of another euphorbiaceous plant had been experimented with. But such was not the case; on the contrary, a number of well-authenticated cases of poisoning by castor-oil seeds are on record, most of them from France, where the seeds are much in use for various purposes as a popular remedy. Chevallier mentions a case, with recovery, of a boy of seven or eight years, who had only taken one—at most two seeds. Other cases of alarming intoxications are on record, after taking three or four seeds. In all European cases of poisoning, the number of seeds taken has rarely exceeded twenty. It should not be forgotten that the seeds are poisonous, both in their unripe and ripe state, and that the cakes remaining after the expression of the oil, retain most of the acrid principle, and have often caused the death of horses and cattle. New Rem., Oct. 1877, p. 294; from Pharm. Zeit., No. 67.

Boomah Nuts.—These are the fruits of *Pycnocoma macrophylla*, Benth., a small tree belonging to the *Euphorbiaceæ.* They were imported into Liverpool from Natal, according to E. M. Holmes, under the name of galls, probably on account of their bearing a strong resemblance to Aleppo galls in shape and size. Externally they are black, and when broken open, exhibit a hard, three-celled endocarp, each cell containing a single seed. The seeds in shape and color are not unlike a castor-oil seed, but are less than half the size, and have no appreciable taste. The Boomah nuts are said to be used for tanning in Natal. The tannin is contained in the outer coat or sarcocarp, and must be very small in amount, considering the size of the fruit, since so large a portion is occupied by the woody endocarp. Ph. J. Trans., Nov. 10th, 1877, p. 363.

URTICACEÆ.

Hops—Culture in New York.—Emery Gilbert Bissel has written an interesting essay on hop-culture in New York. Two varieties of the hop are principally grown in that State, being known as the large and small cluster. No particular difference is to be seen in these two varieties, excepting the one is larger than the other, and no difference is known in quality. Besides these two varieties, a third, known as the Palmer seedling, is now coming into quite extensive cultivation. This variety was first obtained from the seed, by the late Charles Palmer, of Waterville, N. Y., some twelve or fourteen years ago, and is now under successful cultivation in New York, some of the Western States, and in Canada. This variety does not yield quite as well as the other kinds; no difference is to be noticed in the vine, and the hop itself, while of large size and fine quality, is hardly to be distinguished from the large cluster. The peculiarity of this hop is that it matures some three or four weeks in advance of the ordinary kinds, thus enabling the grower to get his crop into the market before the ordinary kinds are fit to pick. Hops are cultivated, picked, dried, and baled in New York after much the same manner as described by W. H. Ramsey in his paper on "Hop Culture in Wisconsin." (See Proceedings, 1875, p. 224.) A. J. Pharm., Nov. 1877, p. 538.

Hops—New Method of Preservation.—A. Breithaupt has conceived, and carries out successfully, a method of preservation of hops, for brewers' use, which is dependent on the complete separation of the volatile oil, and the complete drying of the residual hops. The volatile oil is delivered with the hops to the brewers, to be added to the beer after the process of fermentation is complete. The author's method is as follows: Fresh, or recently dried hops, are placed in large, hermetically closed vessels, which are capable of being heated by steam. A faint current of steam is then passed into the interior of the vessel, and the rupture of the oil-vessels is facilitated by heat applied to the outer surface. Finally a current of air is passed through the vessel, whereby the volatile oil, by the aid of the external heat, is carried through the condenser into a Florentine flask. The operation is finished in a short time; the air and the greater part of the water are then removed by the aid of the pump, after which the hops are completely dried, pressed, and formed into air-tight packages.

When making beer, these hops are used the same as the ordinary, but the bitter principle and the tannin are much more readily extracted, and the infusion is, therefore, more rapidly finished—requiring two hours less time. The volatile oil is added to the beer in the proportion of 10–12 drops per 100 liters, and the aroma produced is much finer than that obtained with ordinary hops. The common method of preserving hops—the only one, in fact, which has hitherto been found to serve the purpose—by means of sulphurous acid, is open to many objections; it has a tendency to change the character of the volatile oil, to convert a portion of the tannin into gallic acid, and, moreover, is liable to introduce arsenious acid into the hops, since the sulphur used is never pure, and usually contains arsenic. Ph. Centrahl., No. 17, 1878, p. 158.

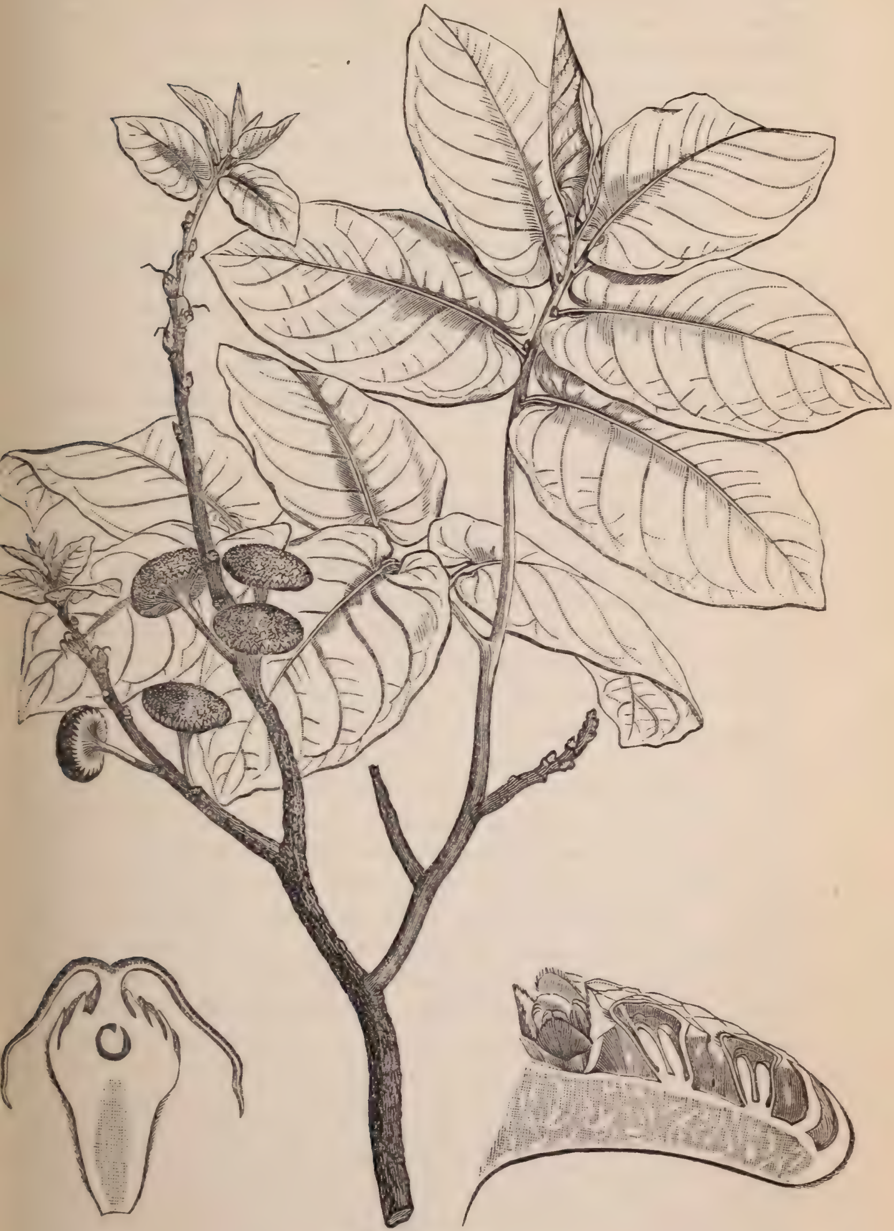
Hops—Constituents.—Mr. Bissel also made some experiments with a view to settle the question whether the lupulin contained the active principle of hop to the exclusion of the bracts. With great care and trouble, the author succeeded in obtaining about an ounce of the bracts entirely free from lupulin. The alcoholic tincture prepared from these had a bitter taste and some odor, but neither of these reminded of hop. The alcohol was distilled off from the tincture—leaving 70 grains of extract—some water was added to the distillate, the alcohol again distilled at a gentle heat, and then the aqueous distillate collected separately. This had a slight foreign odor—not that of hops—had no effect on litmus-paper, and produced no change in the color of solution of permanganate of potassium, evidently containing not more than the merest trace of organic matter. Physiological experiments made with the extract also seem to prove it to be inert. It was composed largely of tannin, with a little bitter extractive.

Some experiments were also made with the endeavor to determine the nature of the tannin of hops. Its property to form green-black precipitates with ferric salts distinguish it from gallotannic acid, whilst its behavior to mineral acids is distinct from that of moritannic acid, which it is stated by Wagner to resemble. A. J. Ph., Dec. 1877, p. 582.

Antiaris Toxicaria, Lesch.—The exaggerated statements respecting the poisonous character of the "Upas tree" have invested it with a certain poetical interest. The tree was described by the Dutch surgeon, Dr. Fœrsch, as "growing in a desert tract with no other plant near it for a distance of ten or twelve miles. Criminals condemned to die were offered the chance of life if they would go to the Upas tree and collect some of the poison. They were furnished with proper directions, and armed with due precautions, but not two out of every twenty ever returned." Later investigations, however, seem to prove that the virulent properties are not as much due to the tree as to the localities in which it grows. It occasionally grows in certain low valleys, in Java, rendered unwholesome by an escape of carbonic acid from crevices in the ground, and which is given off in such abundance as to be fatal to animals that approach too closely. Specimens of the tree are now cultivated in botanical gardens, and it cannot, therefore, have the extreme virulent properties attributed to it; nevertheless the Upas tree is by no means innocent, for severe effects have been felt by those who have climbed the tree for the purpose of bringing down branches and flowers.

The Upas tree, belonging to the nat. ord. Ulmaceæ, often attains a height of 100 feet, and is found native in the islands of

FIG. 63.



Antiaris Toxicaria.

the Indian Archipelago. A flowering branch, portion of male inflorescence, and a longitudinal section of the female flower, are illustrated in the cut, Fig. 63; the stamens and pistils being in separate flowers on the same tree. The male flowers are numerous and inclosed within a heavy involucre formed of several fleshy divisions rolled inwards. The calyx is in three or four pieces and incloses an equal number of stalkless anthers. The female flower has an adherent calyx of several leaves and is terminated by a long two-parted style. It contains a single suspended ovule, and becomes converted, when ripe, into a succulent, drupe-like fruit. The female flowers are solitary, placed in the axils of the leaves, side by side with the heads of the male flowers. The Upas tree, when pierced, exudes a milky juice, which contains an acrid virulent poison, called antiarin. New Rem., June 1878, p. 163.

Shellac—Bleaching.—J. M. Eder recommends that 10 p. of shellac be dissolved in a copper kettle in 120 to 150 p. of water, to which 4. p. of crystallized soda has been added; the solution is filtered through linen into a wooden tub, and a bleaching mixture, composed of 10 p. of chlorinated lime (containing about 30 per cent. chlorine), 10 to 12 p. crystallized soda, and 200 p. water, is then added. When the mixture is cool, dilute hydrochloric acid is carefully added until a little granular shellac begins to be separated; the bleaching being very much hastened by the latter addition, 2 or 3 days only being required, and it is indifferent whether the process be conducted in the light or in the dark. The shellac is then precipitated by conc. hydrochloric acid, collected on a strainer, thoroughly washed, melted under water, and well washed and drawn out in order to give it uniform consistence. It is then perfectly white and has a silky glistening appearance. After a time, however, the surface becomes yellowish, and, when the bleaching has been imperfect, the yellow tint may extend throughout the mass. To prevent this, the author recommends that the formed and drawn out shellac be immersed for about twenty-four hours in the acid liquid from which it has originally separated, adding if necessary a small quantity of fresh chlorinated lime. The surface becomes chalky white, and this white surface appears to prevent the interior portion from becoming yellow. The brightness of the surface is increased by brushing. The shellac so obtained furnishes a perfectly colorless varnish. If the crude material has been very impure, the author recommends that the precipitated shellac be allowed to remain in the acid bleaching liquid for some hours after its precipitation. Long exposure to this acid liquid, however, renders the shellac brittle, and it is then difficult to draw out and shape. Ph. Centr. H., Dec. 20th, 1876, p. 437.

SALICINEÆ.

Willow Bark—Presence of Free Lactic Acid.—D. B. Dott has observed that an infusion of willow bark has a distinctly acid reaction. In preparing salicin by Erdman's process this acid is neutralized by the excess of lime employed, and the salt thereby formed passes into solution. On evaporation to dryness and exhausting the dry mass with alcohol this salt is redissolved along with the salicin, and is retained in solution after the latter has crystallized out. By distilling off the spirit the salt crystallizes out in an impure condition, and may be purified by recrystallization from water, forming, under these conditions, a cauliflower-like mass composed of radiate groups of prismatic crystals. By dissolving the salt in water, treating the solution with just sufficient oxalic acid, filtering, concentrating the filtrate, extracting the residue with ether, and evaporating the ethereal solution—finally over sulphuric acid under a bell jar—a syrupy, intensely acid liquid was obtained, which corresponded in all its characters to lactic acid, while the calcium salt had all the characters of lactate of calcium. The author is unable to state from what species of *salix* the acid was prepared, but as all samples of bark he has examined give acid infusions, it seems probable that lactic acid exists in all the members of the *Salicaceæ.* The chemical investigations of willow bark have hitherto been confined mainly to the active principle; the author's observations are, therefore, highly important, and should encourage the more thorough study of the chemical constituents of the bark. Ph. J. Trans., Sept. 22d, 1877, p. 221.

BETULINEÆ.

Birch-sap.—In March and April the sap of the common birch tree rises with extraordinary power and in great quantity, and escapes freely from any wound that may be inflicted on the tree. This juice, which in some parts of Germany is allowed to ferment, when it is said to yield an agreeable, mild, alcoholic beverage, has been analyzed by O. Henner, who finds it to have the following composition: Acidity, calculated as acetic acid, 0.0156 per cent.; total residue, 1.8255 per cent.; mineral matter, 0.0646 per cent. The solid residue included 0.0176 per cent. of nitrogen and 1.10 per cent. of glucose, cane-sugar being entirely absent. The juice turns the plane of polarized light to the left, 0.2. The ash contains 0.708 chlorine; 20.937 carbonic acid; 0.114 soluble and 1.530 insoluble silica; 7.448 sulphuric acid; 10.855 phosphoric acid; 18.825 lime; 10.105 magnesia; 0.939 soda; 29.283 potassa; being a total of 100.744, for which a correction of 0.158 for oxygen calculated in chlorides must be made. The tree from which the juice was collected grew on a slaty soil. J. Chem. Society, Aug. 1877, p. 212.

CUPULIFERÆ.

Quercus Ægilops.—X. Landerer draws attention to the curious circumstance that the wide distribution of this useful oak tree throughout Greece is brought about by the agency of ravens (Corvus fructilegus). This raven is in the habit of burying the acorns of Quercus ægilops by the thousands to serve as food in the wintertime. As the bird generally forgets where he buries them, the acorns soon germinate and grow up to stately trees, and in this way the raven contributes very materially to the welfare of hundreds of families and thereby to that of Greece, since the crops (valonia of commerce, which are much used in tanning and dyeing) represent an annual income of three to four million drachms. The name ægilops comes from *aix* (a goat), and *opsis* (eye), from a supposed resemblance of the cupula to the eye of a goat. A. J. Ph., April, 1878, p. 173.

CONIFERÆ.

The Turpentines and Resinous Products of the Coniferæ.—Dr. Julius Morel, Professor of Chemistry in the Industrial School, Ghent, has communicated a highly interesting series of papers on the turpentines and resinous products of the Coniferæ to "The Pharm. Jour. and Transactions," beginning with the number of that journal of July 14th, 1877, and running through subsequent numbers at intervals. The importance of these papers demands that more than a passing notice should be given them in this report, and they are therefore reproduced here in as condensed form as was possible. In the Botanical Synonymy the author has followed closely Carrière, "Traité Générale es Conifères," 1867, and he has also found "Pharmacographia" to be of assistance in the compilation of his papers. In giving the botanical synonyms, the author refers to the works in which his authority may be found. Reference to these is here omitted. The Latin, English, French, and German synonyms of the plant, as well as of the product, are indicated by the prefix of the letters *L.*, Latin *E.*, English; *G.*, German; and *F.*, French.

I. STRASSBURG TURPENTINE.

Synonyms.—L., Lacryma Abiegna; Lacryma Abieties; Officinarum Germaniarum Terebinthina Veneta; Terebinthina Argentoratensis. *G.*, Strassburger Terpenthin. *F.*, Térébenthine d'Alsace; Térébenthine de Venice; Térébenthine au Citron (commercial name in France).

Botanical Source.—Abies pectinata.

Abies, Plin.; *Picea*, Dodon.; *Abies fœminea*, Elste.; *Abies taxifolia, fructu sursum spectante*, Tourne.; *Pinus picea*, L.; *Pinus Abies*, Duroy; *Pinus pectinatus*, Lam.; *Abies alba*, Mill. Dict. No. 1 (*non* Mich.) Baumg.; *Abies taxifolia*, Desf.; *Abies pectinata*, D. C.; *Abies vulgaris*, Poir.; *Abies picea*, Lindl.; *Abies excelsa*, Link.; *Abies caudicans*, Fisch.; *Abies argentea*, De Chambr.; *Picea pectinata*, Loud.; *Picea taxifolia*, Hort.

E., Pectinat Fir tree; Silver Fir; Spanish Fir. *G.*, Weisstanne; Edelstanne; Pechtanne. *F.*, Sapin de Vosges; Sapin de Normandie; Sapin pectiné; Sapin argenté; Sapin à feuilles d'If; Sapin commun; Sapin blanc; Sapin en pergne.

Habitat.—Almost all the mountains of Central Europe, the Alps, Apennines, Pyrenees, certain mountains in the Forez and Loire Departments; very common in the Vosges and Black Forest; sometimes met in Transylvania. A variety (*B. Cephalonica*) is met in Continental Greece and in the islands of Euboea and Cephalonica.

Extraction.—The interior layer of the bark of the fir tree is furnished with a large number of resinous ducts, while in the most external layers of the trunk there are formed larger lacunæ, called cellules or utricules, which in distending raise the suberous portion. These utricules are ruptured with the edge of a steel instrument and the oleo-resinous juice escapes. This is collected in bottles and filtered through bark funnels.

Characters.—This turpentine when freshly collected is liquid, whitish and milky, becomes clear after standing some time in the sun, resembles Canadian balsam pretty closely, its color being pale yellow, but its odor more agreeable (being citron-like, hence its French name, térébenthine au citron), and its taste less acid and less bitter. It has the sp. gr. of distilled water, rotates 3° to the left, when examined either in the pure state or previously diluted with one-fourth its weight of benzin, is soluble in ether, chloroform, benzin and hot amylic alcohol, dissolves in glacial acetic acid, absolute alcohol, and acetone without giving an abundant flocculent precipitate. Its solution in ordinary alcohol, also, is only slightly turbid, a granular precipitate separating on standing, and all of its solutions have an acid reaction. Under the microscope, especially with polarized light, it shows the presence of numerous crystals of abietic acid. It possesses marked siccative properties; a hard brittle crust forms on the surface when exposed to air, while in thin layers it hardens completely. With one-sixth its weight of calcined magnesia it acquires a pilular consistence.

Composition.—Caillot, who discovered abietine, a crystallizable principle, in 1830, found it to be composed as follows: Volatile oil, 33.50; resin, insoluble in alcohol, 6.20; abietine, 10.85, abietic acid (resin acid), 46.39; aqueous acid (containing succinic acid), 0.85; loss, 2.21 = 100. Flückiger found 72.4 per cent. of resinous matters (sylvic acid, pinic acid, etc.), and 24 per cent. of an essential oil, boiling at 163° C. (= 324.4° F.), and rotating the plane of polarized light 8° to the right. Rochleder (1865) found in the leaves of the plant a kind of sugar approaching to mannite, which he named "abietite" and found it to be composed of $C_{12}H_{16}O_6$.

II. CANADA BALSAM.

Synonyms.—E., Canadian Turpentine. *G.*, Canada Balsam. *F.*, Baume du Canada; Térébenthine du Canada; Térébenthine du Sapin baumier; Faux baume de Giléad.

Botanical Origin.—Abies balsamea.

Abies foliis solitariis, confertis, obtusis, membranaceis, Clay; *Abies minor, pectinatis foliis, Virginiana, conis parvis, subrotundis*, Pluckn.; *Pinus balsamea*, L.; *Abies balsamifera*, Mich.; *Abies taxifoliis*, Hort.; *Abies balsaminea*, N. Duham.; *Picea balsamea*, Lond.; *Pinea balsamea*, Rich. ex. Gord.

E., Balm of Gilead Fir; American Silver Fir; Balsam Fir. *G.*, Balsamtanne; Balsamfichte. *F.*, Baumier de Giléad; Sapin baumier de Giléad.

Habitat.—It grows abundantly in the United States, in Nova Scotia, and in Canada. It resembles the *Abies pectinata* of Europe, but its cones are more acute at the summit. The same turpentine is yielded by the *Pinus Fraseri*, the small-fruited or double balsam fir of the Americans; and the *Pinus* or *Abies Canadensis* (Canada Pine or Hemlock Spruce Fir), growing in the same countries, appears to contain a similar turpentine.

Extraction.—In this plant the secretory canals are distributed in nearly the same manner as in the *Abies pectinata*, and the turpentine is extracted in a very similar way and filtered in the sunlight.

Characters.—When fresh it is turbid, but like Strassburg turpentine, soon clarifies. Its color is pale yellow, with a greenish tinge, becomes duller and darker in time, but retains its transparency; odor stronger and more (? Rep.) agreeable than that of Strassburg turpentine; taste slightly acrid and bitter, but not disagreeable. Exposed to the air it dries like Strassburg turpentine, but its color becomes perceptibly darker. This modification in color and its odor constitute the characters by which it can be distinguished from the preceding species. It exhibits a slight green fluorescence in direct sunlight, which becomes more pronounced when it is heated to about 200° C. (= 392° F.). Under the microscope it does not present the crystalline and granular structure observed in some other turpentines, resembling, in this respect, Venice turpentine. Its sp. gr. at 14.5° C. (= 58.1° F.) is 0.998; that of water, at the same temperature, being 1.000. Mixed with one-fourth benzin it has a rotating power of 20° to the right. This rotating power is, according to Flückiger, also characteristic of the resin (8.5° to the right), whilst the essential oil rotates in the contrary direction. Canada turpentine is soluble in all proportions in chloroform, benzin, ether, and hot amylic alcohol, its solution reddening litmus. Bisulphide of carbon dissolves it readily, but forms a slightly turbid solution. Glacial acetic acid, acetin, and absolute or 70° to 75° alcohol dissolve it partially, and after boiling, followed by a slow cooling, give up a large quantity of amorphous residue. Colophane and Venice turpentine dissolve completely in these menstrua. One-fifth of its weight of recently calcined magnesia readily brings it to a pilular consistence. The mixture, treated with dilute alcohol and kept during some days at a temperature of 93° C. (= 199.4° F.), with very frequent agitation, yields a hard mass that at last became transparent.

Composition.—Several analyses have been published, that of Bonaster, which is the oldest, determining the following composition: Volatile oil, 18.6; resin soluble in alcohol, 46.0; sub-resin, slightly soluble in alcohol, 33.4; soft resin, similar to the sub-resin, 4.0; bitter extractive, salts, and traces of acetic acid, 4.0 per cent. Wirzen, recently found 16 per cent. of volatile oil and three amorphous resins, one of which had the composition abietic acid. Flückiger's analysis is the most recent. According to this the turpentine contains: volatile oil, 24.0; resin, soluble in absolute alcohol, 59.8; resin insoluble in absolute alcohol, but soluble in ether, 16.2 per cent. The quantitative determination of the volatile oil was made by heating the turpentine on a water-bath during several days; the same specimens distilled with water yielded only 17 to 18 per cent. of volatile oil.

III. COMMON TURPENTINE.

Synonyms.—E., Crude Turpentine. *G.*, Gemeiner Terpenthin. *F.*, Térébenthine commune; Térébenthine de Bordeaux; Térébenthine de Pin maritime; Térébenthine de Boston, or d'Amerique.

Botanical Origin.—European turpentine is yielded by the *Pinus sylvestris* of Russia and Finland, by the *P. laricis* of Austria and Corsica, by the *P. maritima*, Poiret, of the Landes Department and the neighborhood of Bordeaux.

American turpentine comes from the United States, especially from Virginia and the Carolinas, where it is obtained from *Pinus australis*, Mich., and *P. tæda.*

Botanical Synonyms of Pinus maritima.—Pinus maritima altera, C. Bauh.; *Pinus sylvestris maritima, coniis firmiter ramis adhærentibus*, J. Bauh.; *Pinus sylvestris*, B. L.; *Pinus sylvestris*, Mill.; *Pinus pinaster*, Sol. in Ait. Hort. Kew.; *Pinus maritima*, Lamb.?; *Pinus Japonica*, Hort. delig.; *Pinus nepalensis*, Royle ex Lindt. et Gord.; *Pinus Syrtica*, Thore.; *Pinus chinensis*, Knight; *Pinus Novæ Hollandicæ*, Lodd; *Pinus Novæ Zelandica*, Hort.; *Pinus Sancta Helenica*, Loud. ex Gord.; *Pinus neglecta*, Low.

E., Pinaster; Cluster Pine; Maritime Fir. *G.*, Italienische

Kiefer; Strandkiefer. *F.*, Pin de Bordeaux; Pin des Landes; Pin maritime.

Habitat.—In France the maritime pine forms considerable forests, principally in the Landes department and along the seacoast to Mans; it reaches even to Brittany, but there it proceeds from artificial sowing. It is found on the shores of the Mediterranean, and in the mountainous regions of Corsica it grows at an elevation of 1000 meters. It prefers particularly light silicious soils.

Botanical Synonyms of Pinus Sylvestris.—*Tæda*, Plin.; *Pinaster vulgaris prior*, Clus.; *Pinaster sylvestris vulgaris Genevensis*, J. Bauh.; *Pinus sylvestris*, L.; *Pinus sylvestris Genevensis*, Hort.; *Pinus sylvestris, a communis*, Endl.; *Pinus sylvestris Haguenensis*, Loud.; *Pinus sylvestris squamosa*, Rosc.; *Pinus sylvestris scariosa*, Lodd.

E., Scotch Pine; Scotch Fir. *G.*, Gemeine Föhre; Weissföhre; Gemeine Fichte; Kiefer; Tanne, and fifty-five other names, which are given in Haynes's "Abbildung." *F.*, Pin d'Ecosse; Pin sauvage; Pin sylvestre; Pin de Horgenau; Pin de Genève; Pin rouge.

Habitat.—The habitat of the *Pinus sylvestris* ranges over a widely extended surface, but is rather restrained in altitude. The tree constitutes vast forests in the north of Europe, as far as Siberia. In France it is met with alone or mixed with the oak, birch or fir, in the plains and upon the lesser ranges of mountains; in the south, as for instance in the Pyrenees, it does not make its appearance until an altitude of 1200 meters is reached. Usually it occupies the zone immediately below that of the fir. It prefers silicious and fresh soils, but succeeds in dry ones.

Botanical Synonyms of Pinus Laricis.—*Pinaster*, Plin.; *Pinus sylvestris*, var. *maritima*, Ait.; *Pinus Laricis*, Poir.; *Pinus maritima*, Ait.; *Pinus Laricis Poiretiana*, Hort.; *Pinus Laricis Cebenensis*, Hort. ex Gord.; *Pinus Corsica* vel *Corsicana*, Hort.; *Pinus Laricis altissima*, Hort.; *Pinus nigricans*, Hort.

E., Corsican or Larch Pine. G., Schwarzföhre. *F.*, Laricis de Corse.

Habitat.—The Corsican larch pine is met with in mountainous regions, where it occupies a zone above that of the *Pinus maritima.* It commences to appear at an altitude of 1000 meters, and rises to 1700 meters, an elevation at which it exists only as a stunted bush. It seeks argillaceous gravels that result from the disintegration and decomposition of granites, and attains its maximum when these are moderately fresh.

Botanical Synonyms of Pinus Australis.—Pinus Americana palustris, Hort. Angl.; *Pinus palustris*, Mill.; *Pinus Australis*, Mich.; *Pinus Georgica*, Hort. ex Gord.; *Pinus palmiensis,* ex Gord. Pinet. Suppl.; *Pinus palmieri*, Manetti ex Gord.

E., in *America*, Long-leaved Pine, Yellow Pine, Pitch Pine, and Broom Pine in the Southern States; Southern Pine and Red Pine in the Northern States; and Yellow Pine and Pitch Pine in the Middle States. In *England* and the *West Indies*, by the timber merchants, Georgia Pitch Pine.

Habitat.—This pine is found in (from? Rep.) Virginia and (to? Rep.) Florida, on the downs near the sea, and it is very common in certain parts of the Southern States, to which the name of "pine barrens" has therefore been given. In America the tree attains a height of 60 to 70 feet; in England it seldom exceeds 10 or 12 feet.

Botanical Synonyms of Pinus Tæda.—Pinus Virginiæ tenuifolia, Plukn.; *Pinus foliis longissimis*, Cold.; *Pinus foliis ternis*, Gronov.; *Pinus tæda*, L. *E.*, in America, White Pine (in Virginia); Frankincense Pine; Loblolly Pine; Torch Pine; Old-field Pine. *F.*, Pin de l'Encens.

Habitat.—This pine inhabits the sandy and uncultivated spaces of Florida and Virginia, where it forms vast forests; it is met with also in North Carolina.

Extraction.—In Gascony, and especially in the department of the Landes, the production of turpentine is sacrificed to that of the wood. When the tree has a circumference of about 1.20 meters at the base, the bark is roughly removed from one of its sides, then thinned off with the axe, rendering it smooth and even; next, with a special instrument the workman makes towards the foot a rectangular cut, which lays bare the sap-wood, and which is generally 10 centim. wide and 3 centim. high. Below this cut a small trough is scooped out in some salient part of the foot of the tree to collect the product, or a portable trough is placed there. Every week the incision is renewed by the removal of a thin shaving from its upper part, in such manner that the height continually increases, whilst the width is preserved constant, or, better still, decreases; and the incision attains in 5 years an elevation of about 3 meters. It is then abandoned, and a second is commenced, which is managed in the same manner as the first, from which it is separated by a band of bark 5 to 6 centim., or more, wide. In this way the entire circuit of the tree is made, taking care to carry each new cut a little higher than the preceding one. Next, the spaces between the cuts are attacked; these are widened so as to cover more or less the old wounds, and they are always cut after the same fashion. The operation, when well conducted, can extend over 150 years or more, especially if in the earlier period, while the pine is yet weak, a year's rest be given after each period of seven or eight years' working. Sometimes, when the strength of the tree will allow it, two cuts are made at the same time, one above the other. Finally, instead of making the cuts one by the side of another, they are also made opposite to each other, the new ones being cut in the centre of the interval between the oldest. The method of working calculated to preserve the health of the tree, is called "*gemmage à vie.*" If, on the contrary, no attempt is made to preserve it, it is cut upon all sides at once, and the height of the cuts is tripled in a single year; the pine is said then to be "*gemme à mort,*" or "*à pin perdu.*" The working is carried on from May to the end of September. A good workman can cut from 200 to 300 trees per day. The turpentine is removed from the troughs from time to time, the annual yield being, when the trees are in masses, from 5 to 6 kilograms; whilst a vigorous pine, standing alone, will produce annually 20 to 40 kilograms. The pines of the Gascony downs are more productive; those of the Provence do not give such satisfaction. The crude products are of 3 kinds: (1) soft turpentine, which is collected in troughs; (2) galipot, the portion which solidifies in the cuttings, from which it is detached in pieces, bark débris being frequently mixed with it; (3) barras, which has to be scraped off, and is only an impure galipot. The best description of the extraction of *American turpentine* is, according to the author, that of Flückiger and Hanbury ("Pharmacographie," p. 546). These authors remark that the collection of turpentine in the Department of Landes and the Gironde, in the southwest of France, is performed in a more rational manner than in America.

Contrary to what has been observed in the case of the Strassburg turpentine, the resiniferous ducts are met with in this plant more abundantly in the external layer of the wood than in the bark; hence the infrequent exudation of resin from the plant, and the necessity to incise both the bark and the wood.

The turpentine is prepared for commerce, either by melting in a boiler and filtering through straw or metallic gauge, or, preferably, by exposing it to the heat of the sun in a wooden box, in which small troughs are cut to catch the impurities whilst the liquefied turpentine runs off into a recipient placed beneath.

Characters.—The character of common turpentine differs with the variety. The variety known as *Bordeaux* is, when fresh, liquid and transparent; by contact with air it becomes opaque, whitish and semi-solid. On standing it separates into two layers, the upper being semifluid, transparent, and more or less colored, whilst the lower is resinoid and has a crystalline appearance. Its odor is strong, disagreeable, and very characteristic; its taste acrid, bitter, and nauseous; it is highly siccative, a thin layer solidifying in 24 hours, and more promptly with calcined magnesia, one twenty-eighth part of which is sufficient to give it pilular consistence; density variable, but always inferior to water; completely soluble in alcohol, ether, fixed and volatile oils and bisulphide of carbon; yield, on distillation with water, about 25 per cent. of volatile oil; its action on polarized light is lævogyre. The variety known as *German* is found in commerce of a thick consistence, dirty white, turbid and granular; odor and taste very disagreeable; solubilities the same as Bordeaux turpentine. *American or Boston turpentine* has the consistence of thin honey, is yellowish and slightly opaque, becoming transparent by contact with air, has an agreeable odor, and a bitter and acrid taste; separates into two layers on long standing, the upper being clear and slightly fluorescent, the lower slightly turbid and granular, evidencing under the microscope, a mass of small elliptical crystals characteristic of abietic acid. The crystals pass into solution when the turpentine is heated. Bordeaux and German turpentine present the same microscopic characters.

Composition.—Common turpentine contains from 15 to 30 per cent. of volatile oil, which is always mixed with a certain quantity of another oxygenated body. The turpentine from the *Pinus laricis* of Austria contains about 30 per cent. of volatile oil, and 70 per cent. of colophony or resin.

IV. VENICE TURPENTINE.

Synonyms.—L., Terebinthina Veneta; Terebinthina Laricina; Resina laricea; Resina larigna. *E.*, Larch Turpentine. *G.*, Venetianischer Terpenthin. *F.*, Térébenthine de Vénise; Térébenthine de Briançon; Térébenthine de Mélèze; Têrébenthine fine ordinaire; Térébenthine de Strasbourg; Térébenthine Suisse.

Botanical Source.—Larix Europæa. Larix, Plin.; *Larix folio deciduo Conifera*, J. Bauh.; *Pinus Larix*, L.; *Larix decidua*, Wall.; *Abies Larix*, Lam.; *Larix pyramidalis*, Salisb.; *Larix Europæa*, D. C.; *Larix Europæa communis*, Laws; *Larix Excelsa*, Link; *Larix vulgaris*, Spach.

E., European or Common Larch. *G.*, Lärche; Lärchen Fichte; Gemeiner Lerchenbaum; Terpentinbaum; Europäische Ceder; Weisser Lerchenbaum. *F.*, Mélèze commun; Mélèze d'Europe.

Habitat.—The larch will grow rapidly upon almost any soil, and in any situation, for the first 20 or 30 years; but it is only in a clear dry atmosphere, on a cold-bottomed soil, somewhat moist on the surface, that its timber is brought to perfection. It thrives at a height of 1800 feet in the Highlands, where the Scotch pine does not attain a timber size at a greater elevation than 900 feet. In Switzerland it is found in the highest perfection in soil composed of the debris of calcareous rocks, as well as in granite, argillaeeous, and schistose soils.

Extraction.—Larch turpentine is collected, according to Flückiger and Hanbury, in the Tyrol, chiefly about Meran, Botzen, and Trent. A very small amount is obtained occasionally in the Valois in Switzerland, and in certain localities in Piedmont and France. It is obtained from the heart-wood, by making in the spring a narrow cavity reaching to the centre of the stem, at about a foot from the ground. This is then stopped up until the autumn of the same or the following year, when it is opened and the resin taken out with an iron spoon. Thus about half a pound is annually obtained without detriment to the tree; but if a number of wide holes are made, and especially if they are left open, as was formerly the practice in the Piedmontese and French Alps, as much as 8 lbs. may be obtained annually, but the tree soon ceases to yield, and the wood is much impaired. A tree 50 or 60 years of age can yield, however, 3 to 5 kilograms of turpentine for 5 or 6 years in succession, if care be taken to reclose the cavities exactly for the winter.

Characters.—Thick liquid, pale yellow, slightly fluorescent, very slightly turbid, neither granular nor crystalline, always translucid; odor less pronounced than ordinary turpentine, recalling slightly that of nutmeg, but less agreeable. Taste acrid, bitter and aromatic; bitterness, according to Planchon, probably due to "pinipicria," recognized by him in the needles of *Pinus sylvestris.* It has the least decided siccative properties of all the turpentines, is completely soluble in alcohol, its solution reddening litmus, contains a little formic and probably also succinic acid, is perfectly miscible with glacial acetic acid and with acetone, and its solutions in alcohol or benzin rotate the plane of polarized light 9.5° to the right; this rotary power, however, is due to the resin it contains, since the essential oil is lævogyre to the extent of 6.4°.

Composition.—It yields to distillation about 15 per cent. of volatile oil, that boils at 157° C. (= 314° F), and which yields by the action of gaseous hydrochloric acid a crystalline compound, having the composition $C_{10} H_{16} + HCl$. Unverdorben has analyzed a true specimen of Venice turpentine quite recently. According to that chemist it contains two essential oils, one being much more volatile than the other; two resin acids (pinic and sylvic); a neutral resin; a bitter extract; and, finally, succinic and a little formic acid. Pinic acid is present in considerable quantity, and this explains why this turpentine is not granular (crystalline).

V. HUNGARIAN BALSAM (*Térébenthine de Hongrie.*

This turpentine is yielded by the dwarf or mountain pine (*Pinus pumilio*, Haneke.). It is still known under the name of Hungarian balsam (*baume de Hongrie*). It is a pale yellow, clear liquid, having an herbaceous odor and piquant flavor. At present it is scarcely met with in commerce.

VI. CARPATHIAN BALSAM (*Térébinthine des Monts Carpathes*).

This turpentine is yielded by the *Pinus Cembra*, L., known as the Cembran Pine, or the Siberian or Swiss Stone Pine; in Germany, under the name of "Zürbelkiefer;" and in France as the *Cembrot*, *Gouve*, *Tinier*, *Aloies*, or *Auvier*. It attains a height of 19 to 20 meters, and grows at considerable altitudes (2000 meters at least). It is met with in France only in the Briançonnais Alps, and even there it shows a tendency to disappear. The turpentine is liquid, colorless, limpid; has a pleasant odor, and an acid and bitter taste. It is rarely met with in commerce.

VII. TURPENTINE FROM THE ALEPPO PINE (*Pinus Halepensis*, Mill.; *Pin d'Alp; Pin de Jérusalem; Pin floue*).

This pine is tapped in the Provence in the same manner as the maritime pine in Western France, and the same products are obtained, though of less value. If properly attended to the tree will yield annually, for 19 or 20 years, from 6 to 7 kilograms of turpentine, which is known under the name of *Périme Vierge*. After preparing and cooling in cakes, the resin is called "rase." After exhausting the tree for turpentine, the trunk and root are distilled for tar, etc.

VIII. BURGUNDY PITCH.

Synonyms.—L., Pix Abietina. *G.*, Fichtenharz; Tannenharz. *F.*, Térébinthine de Bourgoyne; Poix des Vosges; Paux jaune; Poix blanche; Barras.

Botanical Source.—Abies excelsa. D C.

Picea, Plin.; *Abies*, Dodon.; *Picea Latinorum*, J. Bauh.; *Picea major prima*. rive *Abies rubra*, C. Bauh.; *Abies tenuioro folio, fructum deorsum inflexo*, Toura.; *Pinus Abies*, L.; *Pinus Picea*, Du Roi; *Pinus excelsa*, Lam.; *Abies Picea*, Mill.; *Pinus cinerea*, Rooling; *Abies excelsa*, D.C.; *Picea vulgaris*, Link.; *Abies Longoniana*, Hort. Aliq.; *Abies excelsa gigantea*, Hort.; *Abies Carpathica*, Hort.; *Abies rugosa*, Hort.; *Abies excelsa communis*, Loud.; *Abies excelsa nigra*, Loud.; *Picea excelsa*, Link.

E., The Lofty or Norway Spruce Fir; Common Spruce; Prussian Fir. *G.*, Gemeine rothe Tanne; Gemeine Fichte. *F.*, Faux Sapin; Epicea; Sapin Pesse; Serente, or Scrinto; Sapin gentil; Pinesse; Sapin rouge; Sapin du Nord; Sapin du Norvége.

Habitat.—The *Abies Excelsa*, like the fir, is found in mountainous regions, where the atmosphere is humid, but it supports a lower degree of cold. It is abundant in the Jura and the Alps, rather common in the Vosges, and rare in the Pyrenees. It attains a greater altitude than does the fir, and a height of from 100 to 160 feet.

Extraction.—According to Flückiger, Burgundy pitch is produced in Finland, in the Black Forest, in the Grand Duchy of

Baden, Austria, and Switzerland. On the estate of Baron Linder, at Svarta, near Helsingford, it is obtained by melting the crude resin in contact with the vapor of water, and straining. (Its collection in the Black Forest and in the Bernese Jura, as described by Dr. Flückiger, will be found in Proceedings, 1874 (p. 163), and 1876 (p. 204), and corresponds with the further description given by the author.—REP.)

Characters.—Purified Burgundy pitch is opaque, yellowish brown, hard and brittle when cold, but softening slightly in time and taking the form of the vessel in which it is kept. Its odor is strong, agreeable, and aromatic, especially when warmed, recalling the odor of pine forests; its taste sweet, aromatic, without bitterness; its texture is not at all crystalline. It is very soluble in glacial acetic acid, water, absolute alcohol, and even 75 per cent. alcohol; but its solubility is considerably modified when it contains water and essential oil. This character is sufficient to distinguish clearly between Burgundy pitch and the artificial product prepared with white pitch and water. The resin of Abies excelsa, when freed from essential oil, and dissolved in one part of absolute alcohol, rotates the plane of polarized light 3° to the left; the essential oil, 8.5° in the same direction.

Composition.—Maly, in 1864, found it to be composed of amorphous resins ($C_{44}H_{62}O_4$) and essential oils (which are contained in Burgundy pitch in small quantities only), represented by the formula $C_{10}H_{16}$.

IX. GALIPOT.

Synonyms.—Garipot, Barras, Torche, Résine blanche, Résine commune, and Encens marbré, when the source of the galipot is the *Pinus maritima*, Poir.; *Pinus sylvestris*, L., or the *Pinus Laricio* of Europe; and Serape, Common Frankincense, Gum Thus, Thus Americanum, Thus vulgaris, when it is yielded by the *Pinus Australis*, or *P. Tæda* of America.

Botanical Origin.—The different pines which yield common turpentine.

Extraction.—In the Landes Department galipot is collected just as the turpentine working for the summer is finished. The oleo-resinous juice, much impoverished, still runs from the latest wounds, but as the temperature is not sufficiently elevated to cause the resin to run down quickly to the foot of the tree, or because the essential oil is present in it in less quantity, it dries in the air on the trunk, from the incision to the base, forming upon the tree a white nacreous substance in stalactiform tears.

Characters.—It is met in commerce in solid masses, yellowish-white in color, granular in texture, strong and terebinthaceous in odor, and bitter and aromatic to taste. It is completely soluble in alcohol. American galipot, the common frankincense or gum thus, occurs in soft or solid masses, yellowish or greenish-yellow color, odor and taste, recalling those of *Pinus Tæda* and *C. Australis*, entirely soluble in alcohol, except extraneous impurities, such as pine leaves, strips of wood, etc., which are abundant and require to be removed by filtering. By age it becomes dry, brittle, darker, and less odorous. In both varieties crystals of abietic acid are visible under the microscope.

Composition.—It is very poor in volatile oil, either because the oil evaporates or becomes resinified, or probably because at the period of its exudation the volatile oil is less abundant in the tree. The softer kinds of galipot are distilled with water to obtain the volatile oil, which, however, is less esteemed by painters than oil of turpentine, for what cause is not known. The odor is not so strong and more aromatic than that of oil of turpentine.

X. PITCH.

Synonyms.—*E.*, Black Pitch. *L.*, Pix sicca, vel solida, vel navalis, vel vegetabilis; Arida Pix. *G.*, Schiffpech; Schwarzes Pech; Schusterpech. *F.*, Poix noir; Poix navale des anciens.

XI. WOOD TAR.

Synonyms.—*L.*, Resina pini empyreumatica; Terebinthina empyreumatica; Pix liquida. *G.*, Flüssiger Theer; Holztheer; Fichtentheer; *F.*, Goudron de Norvége; Goudron Tare; Brai liquide; Pissa; Goudron végétal; Poix liquide.

XII. JUNIPER TAR.

Synonyms.—*E.*, Cade oil. *L.*, Pyroleum oxycedri; Oleum Juniperi empyreumaticum; Oleum Cadinum. *G.*, Cade Oel. *F.*, Goudron de Cade; Huile de Cade.

The author refers for the description of the last-mentioned three products, especially pitch and wood tar, to Flückiger and Hanbury's "Pharmacographia."

Finally, the author gives the distinguishing characters of the oils of tupentine of commerce, their uses, adulterations, etc., and describes the sources, methods of preparation, character, etc., of oil of juniper, cedar, etc. Ibid. March 16th, 1878, p. 725; May 11th, 1878, p. 886.

Turpentine—Collection in Georgia and Florida.—Isidore Zacharias has contributed an interesting paper on the production of turpentine, etc., in Georgia and Florida, this industry having during the last few years been developed in those States by Messrs. Lippman Brothers, of Savannah, Ga.

The mode of extracting the crude turpentine is as follows: During the fall and winter the trees are, what is termed by the manufacturers of turpentine, "boxed;" excavations are made into the trunk of the trees about six to eight inches above the roots; the shape of these so-called "boxes" is somewhat peculiar: the lower lip is horizontal, the upper arched; the bottom of the "box" is about five inches below the lower lip and eight to ten inches below the upper, the capacity varying between ½ and 1 gallon. In a day or two after the "boxes" are made, the trees are deprived of the bark to the height of about three feet above the "box," and also some of the wood is scraped off, in order to allow the so-called "*crude*" to exude; this is termed "hacking," the "hacks" being made in the shape of the letter L, and either closed or open; from this the "*crude*" begins to flow about the middle of March, runs best during July and August, and begins to slacken again in September and October. After the "boxes" are filled the "*crude*" is dipped out, by what they call "turpentine dippers," a peculiarly constructed spoon or ladle, into rudely constructed barrels. The trees require scraping every eight or ten days, so as to expose a new surface, the flow of the former "hacking" being clogged by the congelation of resin; a very slight scrape is all that is necessary to set the "*crude*" flowing again. The number of "boxes" in a tree depends upon its size. Generally the trees are hardly fit for use after four or five years, the resin not being worth much and yielding little oil; but in some instances the trees are scraped for such a number of years that ladders are necessary to "hack" the tree afresh, and, therefore, the oleo-resin as it flows downwards into the "boxes," becomes somewhat congealed, and must be scraped off. The "crude" is transferred to the stills in the barrels in which it is collected; 10 barrels producing 2 barrels of "spirits" and 6 of "rosin." The flow of the first year is always the best, and is, therefore, called "virgin dip."

Distillation of Oil.—The stills, which hold between 12 and 20 barrels of "crude," are made of copper in the ordinary shape (the condenser is of the ordinary worm shape) and is set in a brick furnace. It is filled, the dirt, scraps of wood, etc., skimmed off, the head adjusted and luted on, and then heat applied, water being added from time to time, through an opening in the still-head, to keep the "crude" in a soft consistence, for when it becomes too thick it takes longer boiling and the product is thereby injured. The oil is removed from the surface of the water, which distils over with it, from time to time, into the barrels in which it is found in commerce. The resin is drawn at the bottom of the still by opening a stop-cock, and passes through three or four large strainers, the bottom one being covered with cotton batting, into a large trough, from which it is dipped into barrels made for the purpose, and capable of holding from 280 to 400 pounds. The "rosin" of the first year's dip is the best, and consequently worth the most. The opaqueness of rosin is caused by too much water being left in the still. The rosin of the first part of the season of the first year's product is very light-colored and transparent, like "window glass." Each succeeding year the color becomes darker.

Production of Tar.—The method of its manufacture is very simple. A large hole is dug into the ground, in which are placed billets of pine, one on the other. These are slowly burned, when the tar exudes and flows through a trench into a trough, from whence it is ladled into barrels; in this way it is generally contaminated with chips, dirt, etc. A. J. Ph., Nov. 1877, p. 543.

Pitch.—According to Prof. X. Landerer, pitch, which is collected in the Orient from Pinus maritima and P. cephalonica, is used in millions of okkas, in Greece, for making pitch-wine (*retrinato*, which has been in use since the time of Homeros). The collectors (*retrinolektes*) are not content with making incisions through the bark, but cut deeply into the wood itself, sometimes nearly half way through the trunk. Trees mutilated in this way are destroyed in a few years and present a curious appearance, since the leaves on one side are withered and rust-colored, while on the oppisite side they are still green. A. J. Ph., April, 1878, p. 174.

Taxus Baccata.—Cases not unfrequently occur in which animals are poisoned by eating the leaves of the yew tree. These are, according to Dr. Alfred Taylor, occasionally used by ignorant midwives, in the form of infusion, for the purpose of procuring abortion. Prof. Redwood draws attention to a fatal case, in which the yew leaves were used for this purpose, and he has made experiments by which he has determined that fifty grains of the fresh leaves were capable of producing the death of a strong rabbit in five hours, the animal dying without a struggle. In the fatal case referred to, a decoction of about 5 or 6 ounces of yew in two quarts of water was made and three doses of half a teacupful were taken, the first in the evening, the two others during the next day, the last being taken, together with some of the chopped-up unboiled leaves, at night before going to bed. The woman was dead toward morning, although no symptoms had appeared before about one o'clock in the night.

The yew appears to contain a volatile oil, and also an amorphous alkaloidal substance, which has been isolated under the name of taxin.* It is probable, the author says, that the oil gives it the property of savin, and the alkaloidal substance that of foxglove. The effect observed in the case alluded to seems to justify the anticipation that taxin may prove a valuable therapeutic agent, and the author is having some of it prepared with a view to further investigation of this subject. Ph. J. Trans., Nov. 10th, 1877, p. 361.

Thuja Occidentalis.—Dr. James R. Leaming, of New York, has communicated, at the request of the editor of "New Remedies" (Nov. 1877, p. 341), his experience with Thuja occidentalis as a remedial agent. Dr. Leaming is by no means an enthusiast concerning the value of the remedy†—more familiarly known by its common name "arbor vitæ"—and does not claim for it any extraordinary powers, but he has for some years past been accustomed to use it occasionally, and says concerning it as follows:

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* W. Marmè describes "Taxia" to be a white *crystalline* powder (see Proceedings, 1876, p. 367).—REP.

† The parts of the plant used are presumably the small twigs and leaves. —REP.

"The *fluid extract* (which see) or saturated tincture may be given in drachm doses from three to six times daily. It may be given in malignant disease or for pulmonary hæmorrhage in a glass of milk or in cod-liver oil. It may also be applied to cancerous ulcerations or tumors. It may be applied in the cavity —in the os—or to the cervix of the uterus in malignant disease, or in non-malignant, when there is a flabby condition of the parts with a tendency to bleed; and also, under the same conditions, to the throat. It may be applied to warts, and especially to venereal warts. It may be given in amenorrhœa from simple causes, but does not affect a healthy gravid uterus."

The *Elixir of thuja* (which see) and glycerin is a more elegant mode of administering the medicine, and is a valuable substitute for cod-liver oil. The *glycerole* (see Glycerites) may be made into suppositories, or it may be mixed with the fluid extract, for application to the os uteri upon a pessary of cotton.

b. Animal Drugs.

ANNULOSA.

Leech-fishing in Greece.—M. Belle, writing in "Tour du Monde," says: A strange scene is to be witnessed on the borders of Lake Copios, near the site of the ancient Orchomea, in Greece. Ragged individuals are observed to enter the water up to their knees, and stand a short time among the rushes and reeds. Then they come out, sit on a stone, and scrape their legs, which are covered with black spots. They are leech-fishers. The fisher, in this case, is his own bait. For two or three months these miserable creatures, all foreigners, will make as much as twenty francs a day, and they spend about half of it in drink. A few individuals, however, at the end of the season, carry off considerable sums, but this class do not themselves enter the lake; they drive in old worn-out horses. Presently a trembling seizes the unhappy animal. He is then brought out, his legs and belly covered with a slimy mass of annelids. Staggering a few paces he falls on his side, with contracted nostrils and leaden eye. The leeches are detached, and the horse is turned into the neighboring waste land for four or five days in order to become a fresh victim. As the end of the season approaches, however, the horse, exhausted and considered difficult to sell, is at last not granted such respite. He is brought from the lake only for the time necessary for the removal of the leeches. He is not even allowed to eat, and his whole body is then delivered up to the hungry animals. M. Belle says he has even seen the eyelids disappear under a thick layer of leeches. Ere long the horse has not strength enough to drag himself out of the marsh, so he is brought out by the owner, scraped, and flayed while yet alive. Chem. and Drug., Feb. 1878, p. 55; from Med. Press and Circ.

INSECTA.

Cantharis Vesicatoria—Metamorphoses.—For forty years Lichtenstein has been endeavoring to trace the history of the cantharides from the egg to the perfect insect. Only this year (1877) has he succeeded in the attempt. On June 27th he gathered some fecundated females from an ash tree and confined them in a glass jar containing earth. Two or three days after they laid, in little cylindrical holes they had made, white hyaline eggs, agglomerated in masses 30 to 60 each. Seven days after, small larvæ, named triongulins by Dufour, appeared from the eggs. They were a millimeter long, of a deep-brown color, with the meso and metathorax and the first segment of the abdomen whitish. The abdomen has at the extremity two long threads. After numerous tedious and unsuccessful trials, the author persuaded these little creatures to feed on the stomachs of bees killed in the act of sucking honey from flowers. Five or six days afterwards, when they had much increased in size, their skins split and a new form of larvæ appeared. These were milk white, without caudal appendages, and with a soft skin instead of the leathery envelope from which they had just emerged. After more unsuccessful trials these were induced to feed on the concreted honey of a bee of the genus Ceratina. They grew and three times cast their skins. The jaws, at first smooth and pointed, gradually acquired on the inner surface one and then two teeth; the antennæ changed their form; the eyes, at first prominent, gradually diminished, and after about thirty days, when the larva had increased to about two cm. in length, it showed signs of wishing to change its condition. It was allowed to burrow in the earth in a glass tube which could be withdrawn for examination. Nine days after, on September 17th, it was found that the larva had changed to a true chrysalis with a coriaceous shell. It was slightly curved, of a clear brown, with the head and feet showing themselves under little rounded projections. The final transformation from the chrysalis to the perfect insect will not take place until next spring (1878). Up to this time only the first stage of the metamorphosis, that of the two-tailed larva, has been known. A complete account of the transformation, with illustrative drawings, will appear in the "Annales de la Soc. Entomologique de France." Chem. and Drug., Nov. 1877, p. 439.

Doryphora Decemlineata—Examination for Cantharidin.—It has been occasionally asserted that the Colorado potato beetle caused blistering of the hands of its captors. These reports induced L. Dembinski to examine the full-grown beetle and its larva for cantharidin, the extraction of which was attempted with chloroform and with ether, with negative results. A. J. Ph., Nov. 1877, p. 550.

PISCES.

New Fish-liver Oil.—Dr. Markonnet, of St. Petersburg, has made experiments with the oil obtained from the liver of lampreys (*Petromyzon fluviatilis*), which are obtained in immense quantities at the mouths of rivers emptying into the Caspian Sea. It looks like olive oil, has a tolerably agreeable taste, is thinner than cod-liver oil, contains more iodine than the latter, and is an efficient substitute for it. Its price is only about one-eighth of that of cod-liver oil. New Rem., July, 1877, p. 207; from Pharm. Zeit., 1877.

Cod-liver Oil—Determination of Iodine.—B. Barral saponifies the oil with potassa, incinerates the soap formed, and extracts the alkaline residue with alcohol, which takes up the iodine as potassium iodide. He finds, however, that if the incineration is too long continued, the result may be vitiated, since the alkaline iodide may be decomposed and the iodine volatilized. The difficulty is avoided by the use of an apparatus of the author's device. The author has determined the absence of iodine in olive, almond, and mustard oils, but found it invariably in cod-liver oils. He has also determined, that when iodine is administered internally, it may be determined in the fatty organisms. Bernard's experiments had previously determined that under these conditions iodine is found in all the secretions. The author administered 50 cgrm. of iodide of potassium to a goat daily for 8 days, after which the milk was collected; in the well-washed butter prepared from this milk, iodine was distinctly determined. The kidney fat of a suckling goat, whose mother had been dosed in the same way, also contained iodine. Normal cow's butter contained no iodine. Schweiz. Wochenschr.; from Ph., June 22d, 1877, p. 199.

MAMMALIA.

Musky Excrements of Antilope Dorcas, L.—Proposed Substitute for Musk.—Dr. E. Bertherand, a physician in Algiers, draws attention to the excrements of the gazelle, *Antilope Dorcas*, L., which possess a powerful musk-odor, and which he has found to possess value in the treatment of hysteria in place of true musk. A quantity of these excrements, which are somewhat larger than a pea, weigh from 12 to 15 ctgr., and may be obtained in great abundance, the animal being found in large herds on the plains of the Sahara, were sent to Mr. Jacquème, of Marseilles, who found them to contain: 7 per cent. of matter soluble in alcohol; 3.10 per cent. of matter soluble in water; 26.50 per cent. of insoluble matter, and 63.40 per cent. of residues of vegetable food. The portion of matter soluble in alcohol is the most important. It is composed of a resin, an acid resembling benzoic, biliary acid, and biliary coloring matter. The resin has a musk-like odor; it is soluble in bisulphide of carbon, but its odor is thereby changed. The aqueous extract contains ammonia and chloride of sodium. The insoluble mineral components contain much phosphate of calcium. The author recommends the alcoholic tincture and extract for internal administration. Zeitschr. Œst., Ap. Ver. No. 2, 1878, p. 29.

INORGANIC CHEMISTRY.

OXYGEN–HYDROGEN.

Oxygen—Liquefaction.—The successful liquefaction of oxygen by Raoul Pictet must be regarded as one of the most important scientific achievements. M. Pictet has communicated to Chem. News (Jan. 4th, 1878), a detailed account of the means employed and diagrams of the apparatus used. This paper is reproduced in this report in full, the importance of the subject justifying this deviation from the general rule.

The object of the author has been to demonstrate experimentally that molecular *cohesion* is a general property of bodies, to which there is no exception. If the permanent gases are not capable of liquefying, we must conclude that their constituent particles do not attract each other, and thus do not conform to this law. Thus, to cause experimentally the molecules of a gas to approach each other as much as possible, certain indispensable conditions are necessary, which may be expressed thus:

1. To have the gas absolutely pure, with no trace of foreign gas.
2. To be able to obtain extremely energetic pressures.
3. To obtain intense cold, and to subtract heat at these low temperatures.
4. To utilize a larger surface for condensing at these low temperatures.
5. To be able to utilize the rapid expansion of the gas from extreme condensation to the atmospheric pressure—an expansion which, added to the preceding means, will *compel* liquefaction.

Having fulfilled these five conditions, the following alternative may be formulated:

When a gas is compressed to 500 or 600 atmospheres, and kept at a temperature of —100° or —140° C. (= —148° or —220° F.), and it is allowed to expand to the atmospheric pressure, one of two things takes place,—

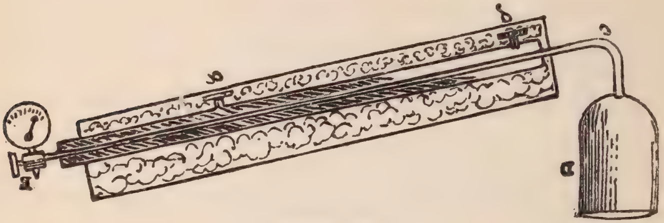
Either the gas, obeying the force of cohesion, liquefies and yields its heat of condensation to the portion of gas which expands and loses itself in the gaseous form; or, on the hypothesis that cohesion is not a general law, the gas must pass to the absolute zero and become inert, that is to say, impalpable powder.

The work done by expansion will not be possible, and the loss of heat will be absolute.

Struck with the truth of this alternative, which is rendered certain by thermo-dynamic equations based on accurate data, M. Pictet sought to produce a mechanical arrangement which should entirely satisfy these different conditions, and he has chosen the complicated apparatus (Fig. 64), of which the following is a brief description:

Two pumps, P_3 and P_4, such as are used industrially in ice-making, are taken for exhaustion and compression. These pumps are coupled in such a way that the exhaustion of one corresponds to the compression of the other. The exhaustion of the first communicates with the tube (*R*), of 1.1 meters length and 12.5 centimeters in diameter, and filled with liquid sulphurous acid. Under the influence of a good vacuum the temperature of this liquid rapidly sinks to —65° C. (= —85° F.), and even to —73° C. (= —99.4° F.), the extreme limit is attained. Through this tube of sulphurous acid passes a second smaller tube (*S*), of 6 centimeters diameter and the same length as the envelope. These two tubes are closed by a common base. In the central tube is retained compressed carbonic acid, produced by the reaction of hydrochloric acid on Carrara marble. This gas being dried is stored in the oil gasometer (*G*) of one cubic meter capacity. At a pressure of from 4 to 6 atmospheres the carbonic acid easily liquefies under these circumstances. The resulting liquid is led into a long copper tube (*B*), 4 meters in length and 4 centimeters in diameter. Two pumps, P_1 and P_2, coupled together like the first, exhaust carbonic acid either from the gasometer (*G*) or from the long tube (*B*) full of liquid carbonic acid. The ingress of these pumps is governed by a three-way tap (*H*). A screw valve cuts off at will the ingress of liquid carbonic acid in the long tube. It is situated between the condenser of carbonic acid and this long tube. When this screw valve is closed and the two pumps draw the vapor from the liquid carbonic acid, contained in the tube 4 meters long, the greatest possible lowering temperature is produced; the carbonic acid solidifies and descends to about —140° C. (= —220° F.). The subtraction of the heat is maintained by the working of the pumps, the cylinders of which take out 3 liters per stroke, and the speed is 100 revolutions a minute. Both the sulphurous acid tube and the carbonic acid tube are covered with a casing of wood and non-conducting stuff

FIG. 64.



Pictet's Retort.

to intercept radiation. In the interior of the carbonic acid tube (*B*) passes a fourth tube (*A*), intended for the compression of oxygen. It is 5 meters long and 14 millimeters in external diameter. Its external diameter is 4 millimeters. This long tube is consequently immersed in solid carbonic acid and its whole surface is brought to the lowest obtainable temperature. These two long tubes are connected by the ends of the carbonic acid tube, consequently the small tube extends about 1 meter beyond the other. This portion is curved downwards and the two long tubes are placed in a slightly inclined position, but still very nearly horizontal, as shown in the drawing. The central tube is curved at *A*, and screws into the neck of a large horizontal shell (*C*), the sides of which are 35 millimeters thick. The height is 28 centimeters and the diameter 17 centimeters. This shell contains 700 grams of chlorate of potassium and 256 grams of chloride of potassium mixed together, fused, then broken up, and introduced into the shell perfectly dry. When the double circulation of the sulphurous and carbonic acid has lowered the temperature to the required degree the shell is heated over a series of gas-burners. The decomposition takes place at first gradually, then rather suddenly towards the end of the operation. A pressure-gauge (*M*), at the extremity of the long tube, permits the constant observation of the pressure and the progress of the reaction. The gauge employed is graduated to 800 atmospheres and was expressly made for M. Pictet by Bourdon, of Paris. When the reaction is terminated the pressure exceeds 500 atmospheres but it almost immediately sinks a little and stops at 320 atmospheres. If at this moment the screw tap (*r*), which terminates the tube, is opened, a jet of liquid is distinctly seen to spirt out with extreme violence. If the tap is then closed, a second but less abundant jet, can be obtained.*

Pieces of charcoal, slightly incandescent, put in this jet inflame with inconceivable violence. The author has not succeeded in collecting the liquid, but hopes by the construction of a suitable pipette to retain a little of this liquid. The experiments have been repeated before the members of the Physical Society, and afterwards, also, in the presence of a number of scientific men, and were successful in every instance. The escaping jet was viewed by the aid of a ray of electric light on the latter occasion, and was found to be composed chiefly of two parts; one central, and some centimeters long, the whiteness of which showed that the element was liquid, or even solid; the other exterior, the blue tint of which indicated the presence of oxygen compressed and frozen in the gaseous state. The author's communication is dated Geneva, December 25th, 1877. He hopes, furthermore, to utilize a similar arrangement in attempting the condensation of hydrogen and nitrogen.

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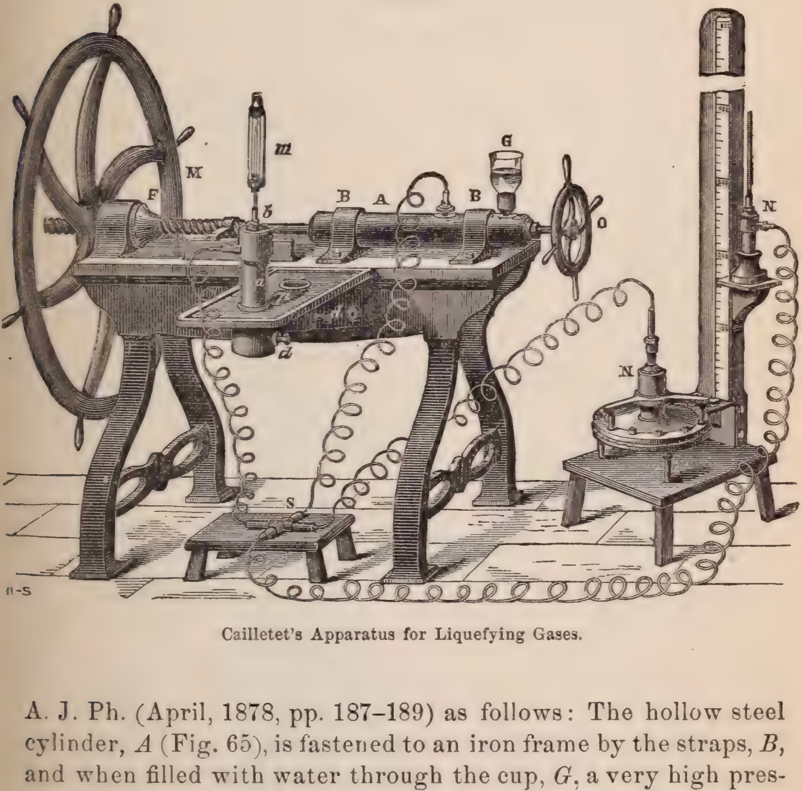
* The author gives a separate description of the drawings, which is simply a repetition of the foregoing, with the exception of that portion of the apparatus marked *Q*. This is a tubular condenser of sulphurous acid compressed by the pumps. This body, when liquefied, returns by the small tube (*f*) to the tube (*R*). The cold water for condensing the sulphurous acid passes through the apparatus (*E E*).

Liquefaction of Hydrogen.—On the 11th of January, 1878, M. Pictet telegraphed to "Chemical News" (Jan. 18th, 1878, p. 23), that he had succeeded in liquefying hydrogen at 650 atmospheres and 140° C. of cold; that it solidifies by evaporation, being projected from the tube in an intermittent jet of a steel-blue color, followed by violet projection, like small shot, on the ground, with a very characteristic harsh, shrill sound. Further explanation is given in "Journal de Genève" (Jan. 10th, 1878). The process consists in decomposing formate of potash by caustic potash, a reaction which, as proved by Berthelot, gives hydrogen absolutely pure. The pressure commenced to rise at half past eight; gradually and without any stoppage it attained, at seven minutes past nine, 650 atmospheres, at which point it remained steady a few instants. At this point the tap was opened, and a steel-blue jet escaped from the orifice, producing a hissing sound like a bar of red-hot iron plunged into water. The jet suddenly became intermittent, and there could be observed a hail of solid particles projected violently to the ground, on which their fall produced a crackling noise. The tap was closed, and the pressure, which was then at 370 atmospheres, gradually descended to 320, where it remained for some minutes. It then rose to 325. At this moment the tap, on being opened a second time, only allowed a jet to escape intermittently, rendering it evident that a crystallization had taken place in the interior of the tube. The proof of this was established by the escape of hydrogen in the liquid state when the temperature began to rise on stopping the pumps.

A few days after Pictet's successful liquefaction of oxygen, on the 31st of December, L. Cailletet effected the liquefaction of hydrogen, nitrogen, and atmospheric air, in Paris, thus proving that all gases can be liquefied. The apparatus whereby this was accomplished is illustrated by Figs. 65, 66, 67, and is described in

FIG. 65.



Cailletet's Apparatus for Liquefying Gases.

A. J. Ph. (April, 1878, pp. 187–189) as follows: The hollow steel cylinder, *A* (Fig. 65), is fastened to an iron frame by the straps, *B*, and when filled with water through the cup, *G*, a very high pressure may be produced in any vessel with which it may be connected, upon turning the large hand-wheel, *M*, the hub of which, revolving in the journal-box, *F*, forms a nut, by which the square-threaded screw of a steel plunger is worked. The flow of water is controlled by a screw-plug operated by a small hand-wheel, *O*, whereby also the pressure exerted upon gases may be suddenly relieved. The water is forced through a small metal tube into the hollow cylinder, *a*, which is supported by the tablet, *p*, and capable of withstanding a pressure of 900 to 1000 atmospheres, measured by the *N* and *N′*. *a* contains the mercury reservoir, into which is plunged the glass tube filled with gas. This part of the arrangement is shown in Fig. 66, which is half size. Fig. 67 represents the same portion of the apparatus supported

FIG. 66.

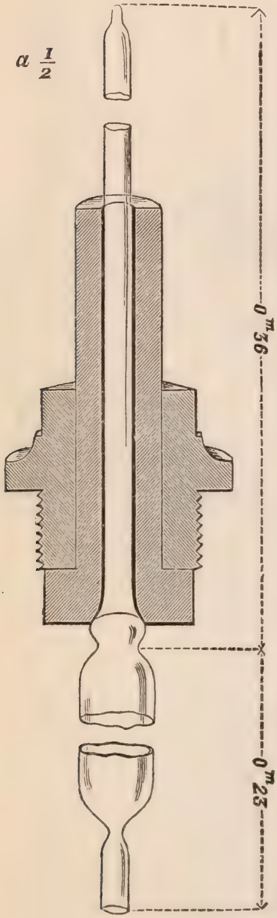
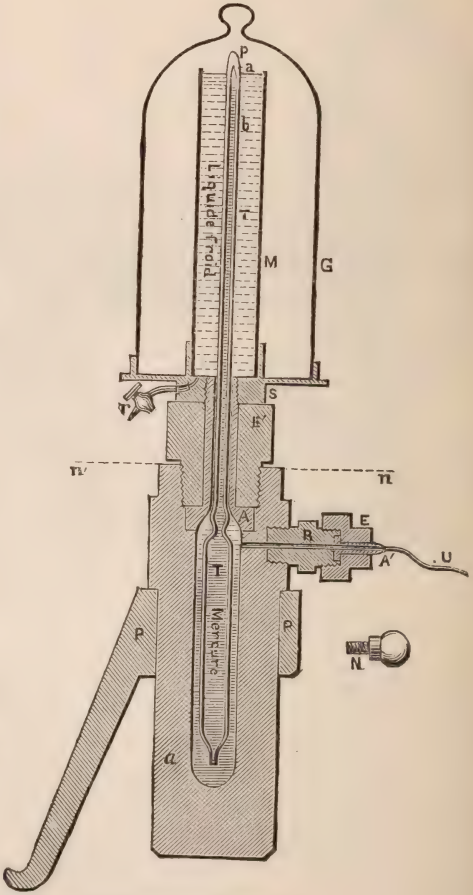


FIG. 67.



Cailletet's Apparatus for Liquefying Gases.

on a tripod, *P*, for use in lecture experiments in connection with any powerful force-pump. *E* is a hollow nut for connecting the pipe *U*, and *N* is a plug for closing the orifice in *R*, when the reservoir *a* is being filled with mercury. After introducing the open end of the gas tube, *T*, into the mercury, the other parts of the apparatus are placed in position, as shown. The upper end of *T* is surrounded by the glass cylinder, *M*, containing liquid nitrous oxide or other freezing mixture, and covered by the bell-glass, *G*, which contains material for absorbing moisture which would otherwise collect upon *M*, and obstruct observation. The liquid freezing mixture may be withdrawn through the stop-cock, *r*.

The water entering through *U* presses upon the mercury, forcing it into *T*, and compressing the gas, which is finally liquefied between *b* and *p*. The apparatus is easily managed, and with it and the aid of the oxy-hydrogen light, all the phenomena of the liquefaction of gases can be projected on the screen.

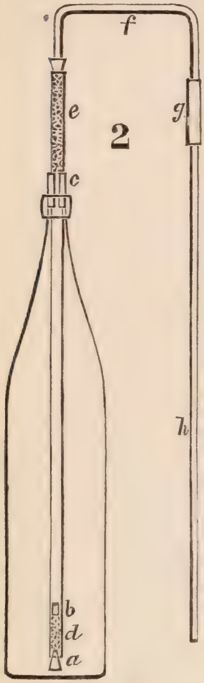
In "Chem. News" (Jan. 11th, 1878), some of the particulars of the liquefaction of gases by M. Cailletet, are extracted from his paper of Dec. 31st, 1877, to the Academie des Sciences.

Nitrogen.—Pure and dry nitrogen compressed to about 200 atmospheres, at a temperature of +13° C (+55.4° F.) [= 13° C (= +8.6°F.) ? Rep.], then allowed to expand suddenly, condenses in the most perfect manner; it first produces an appearance like that of a polarized liquid in small drops of appreciable volume; this liquid then gradually disappears from the sides of the centre of the tube, at last forming a sort of vertical column following the axis of the tube. The duration of these phenomena is about three seconds.

Hydrogen.—This, which has always been considered the most incondensable gas, finally succumbed when subjected to a pressure of 290 atmospheres, and then suddenly allowed to expand. An extremely attenuated and subtle mist, suspended in the gas, was formed and suddenly disappeared.

Air was likewise condensed in the manner described. The author's experiments were made before such authorities as Boussingault, Berthelot, H. Sainte-Claire Deville, and others, who confirm the correctness of M. Cailletet's observations. In a subsequent paper (see Ch. News, Jan. 25th, 1878), the liquefaction of *oxygen* and *carbonic oxide* are described; and in "Chem. News" (Feb. 8th, 1878), M. Berthelot's confirmatory remarks are recorded.

FIG. 68.



Sulphuretted Hydrogen Apparatus.

Sulphuretted Hydrogen—A Cheap and Excellent Generator.—C. A. Müller has devised the generator illustrated by Fig. 68, and recommends it highly for the ordinary laboratory. It is constructed of an ordinary Rhine wine bottle of white glass and having a flat bottom. Into the neck of this, and reaching to near the bottom, a glass tube of 1 ctm. diameter is fastened by means of a cork ring, which is cut so as to allow the communication of the interior with the external air. A perforated cork, *b*, is then introduced into the lower part of the tube to the height of about 3–4 ctm., the orifice is stopped with the notched cork, *a*, the space between the two, *d*, having previously been loosely filled with cotton. Sulphide of iron is now introduced through the upper orifice of the tube until it is filled up to the height of the neck of the outer bottle, and the upper portion of the tube, which should extend about 10 ctm. above the neck of the bottle, is then also loosely filled with cotton. The arrangement of the delivery tube requires little explanation; it is provided, at *g*, with a small piece of rubber tubing, to which a pinch-cock is affixed for the purpose of regulating or stopping the generation of gas. When using the apparatus, the bottle is filled with diluted sulphuric acid to such height that when the generating tube is introduced it shall reach to within 3–4 ctm. of the mouth, the tube is then introduced, a layer of oil of turpentine, 1 ctm. high, is poured on the surface of the acid, and the cork ring is slipped into its place. Slight pressure on the pinch-cock will at once cause a flow of gas, and when it is closed, the generated gas presses the liquid in the tube back into the bottle, thus preventing further action on the sulphide. The oil of turpentine on the surface of the acid prevents the escape of H_2S dissolved in the acid liquid. Arch. Ph., April, 1878, p. 340.

NITROGEN.

Nitrogen.—W. Gibbs remarks that the method of obtaining pure nitrogen generally given in textbooks, which is based upon the decomposition of nitrate of ammonium, is practically useless, because it is necessary to employ an absolutely pure salt, which is very difficult to prepare, and even then traces of nitric oxide accompany the product. On mixing a solution of commercial nitrate of sodium with a solution of sulphate or nitrate of ammonium, the neutral or alkaline mixture undergoes hardly any change. Addition of acetic acid produces an effervescence of nitrogen, mixed, however, with considerable nitric oxide; but if to the mixture of the two salts a strong solution of bichromate of potassium be added until the free alkali is neutralized and the bichromate is present in considerable excess, the liberation of nitric oxide is entirely prevented. It is then only necessary to warm the mixture, when pure nitrogen is evolved as easily as carbonic acid gas from carbonates. If, however, the salts employed contain chlorine, the nitrogen must be washed by passing through a solution of soda or potassa. New Rem., Sept. 1877, p. 264; from Ber. d. Deut. Ch. Ges., 1877.

Nitrous Acid.—In a former paper on *diamido-benzoic acid*, Peter Griess has drawn attention to the extremely delicate reaction which it gives with nitrous acid, affording a distinct yellow coloration to its solutions containing 1 p. in 5 *million* parts, and he based upon this reaction a quantitative method for the determination of nitrous acid. The method, however, appears not to have been generally adopted, probably on account of the difficulty of obtaining diamido-benzoic acid. To meet thislatter objection, the author has now experimented with *metadiamido-benzol*, which is readily obtained in commerce (C. A. F. Kahlbaum, Berlin), and he finds not only that this compound will answer the same purpose as the diamido-benzoic acid, but that it is twice as delicate, a distinct yellow color being produced in solutions containing 1 p. of nitrous acid in 10 million parts. The metadiamido-benzol is best used in solution with diluted sulphuric acid (5 grams of the base to 1 liter of water, and sufficient diluted sulphuric acid to produce a decided excess.) The reagent must of course be perfectly colorless, which may be effected by treatment with animal charcoal. It may be kept for months in well-closed vessels. Ph. Centralh., Nov. 23d, 1878, p. 209.

Nitrites—Preparation.—A. Etard prepares the alkaline nitrites by taking advantage of the reducing agency of sulphites or nitrates. Equivalent quantities of sulphite of sodium (or potassium) and the nitrate of the alkaline base desired are, after thorough drying, melted together in a crucible at a red heat. After cooling the mass is readily pulverized and the pure nitrite may then be extracted by alcohol, in which, as well as in water, the alkaline nitrites are very soluble. A comparatively small quantity of alcohol is, therefore, only necessary, and large quantities can by this method be made very rapidly. When operating on an industrial scale, the nitrites may be readily separated from the sulphate formed by the agency of water alone. Ph. Centr. H., Aug. 30th, 1877, p. 283.

Nitrite of Potassium—Preparation.—Persoz gives the following method, which readily yields an abundance of perfectly pure nitrite of potassium: 200 grams of powdered copper obtained by the careful distillation of acetate of copper as an impalpable powder, are added to a solution of 320 grams of nitrate of potassium in the smallest possible quantity of hot water; the mixture is thoroughly dried, and when all the copper has been moistened, which is attended with some difficulty, the mixture is evaporated, under continuous stirring, to complete dryness. The heat is then carefully continued until the mass ignites spontaneously. As soon as the ignition is complete, the mass is allowed to cool, extracted with cold water, and crystallized. The salt, so obtained, is perfectly pure, a slight excess of copper being provided for in the above proportions, and the complete decomposition of the nitrate thus insured. The residual cupric oxide may be used for organic analysis. The crystals of nitrite of potassium are at once melted, and being very hygroscopic the fused salt is immediately transferred to well-stoppered bottles. Copper, powdered by ordinary means, however fine it may be, will not answer for this process. The decomposition of the acetate of copper readily takes place at 200° to 250° C. (= 392° to 482° F.). Ph. Centraln., Nov. 3d, 1878, p. 27; from Chemiker Zeit.

Nitric and Nitrous Acid—Delicate Test.—N. H. Martin has found "diphenylamine" ($C_{12}H_{11}N$), a base produced by the action of various phenol compounds on aniline, to be a delicate reagent for the presence of nitric or nitrous acids. A piece of the substance—about the size of a mustard seed—is put into a test-tube, a little sulphuric acid is poured over it, and then a few drops of water are added to increase the temperature sufficiently to effect the solution of the diphenylamine. If now the solution to be tested is gently poured upon the reagent in the test-tube, a beautiful and very permanent blue coloration is produced at the junction of the two liquids, and if there be any quantity of the nitrogen acids, the color becomes almost black. 1 part of nitric acid B. P. in 10,000, or 1 part of nitrate of potassium in 30,000 parts of water, give the reaction unmistakably. Yearbook of Ph., 1877, p. 562.

Nitric Acid.—J. J. Acworth and H. E. Armstrong communicate the result of some comprehensive researches on nitric acid and the oxides of nitrogen in "J. Chem. Soc." The paper in the July (1877) number treats of the gases evolved by the action of metals on nitric acid and embraces: 1. A general introduction; 2, theory of the formation of the various products obtained on dissolving metals in nitric acid; 3, method of experiment; 4, mode of stating the results; 5, action of copper on nitric acid; 6, do. of silver; 7, do. of zinc; 8, do. of cadmium and magnesium; 9, do. of iron; 10, do. of nickel, cobalt, indium, and aluminium; 11, do. of tin, lead, and thallium; 12, do. of alloys on nitric acid.

Nitric Acid—New Test.—David Lindo makes the new test which he proposes for carbolic acid (which see) available as a test for nitric acid and nitrates, as follows: 8 or ten drops of a solution of carbolic acid, 5 grains to the fluid ounce, are placed in a porcelain capsule, and mixed with 30 drops of concentrated sulphuric acid; 2 or 3 drops of the fluid to be tested are then added, when, if nitric acid or nitrates are present, a brown color, changing on agitation to a beautiful red, is produced; 1 grain of nitre in 1 ounce of water, gives an excellent reaction; in 2 ounces of water a very good; in 4 ounces, still good; and in 6 ounces of water the reaction becomes uncertain. Ch. News, Oct. 5th, 1877, p. 155; see also Ibid. Jan. 4th, 1878, p. 3.

Concentrated Nitric Acid—Preparation.—The preparation of conc. nitric acid (sp. gr. 1.5) by the method generally recommended—heating equal parts of nitrate of potassium and sulphuric—requires a high heat, constant attention, and, in the experience of Henry Trimble, is very liable to terminate in the fracture of the retort. He has tried the following method, and recommends it as preferable: One part of commercial nitric acid is placed in a retort to which has been closely attached a suitable receiver, and two parts of strong sulphuric acid are added. The whole is placed on a wire gauze, over a Bunsen burner flame not larger than that of an ordinary candle. In about eight or ten hours all the nitric acid will have distilled over, leaving the sulphuric acid in the retort, and though slightly diluted by the water retained, the sulphuric acid may be used in a variety of ways. The nitric acid so obtained, being liable to slight decomposition, is better prepared only when wanted for immediate use. A. J. Ph., Nov. 1877, p. 537.

SULPHUR.

Sulphur—Estimation.—H. Weidel and M. v. Schmidt propose a modification of Sauer's method of estimating sulphur, whereby they insure a complete decomposition of organic bodies containing sulphur, as well as an entire oxidation of the sulphurous acid formed. The substance to be analyzed is mixed with six times the weight of boracic acid in a platinum boat, and caused to undergo combustion in a current of oxygen in a glass tube containing platinum black. The method is especially advantageous in the analyses of the salts of the higher sulpho-acids in the aromatic series. Chem. News, July 6th, 1877, p, 7.

Sulphur—Solubility in Acetic Acid.—Leo Liebermann has observed that concentrated or somewhat diluted acetic acid will dissolve appreciable quantities of sulphur, which are separated again as a milky precipitate on the addition of water, or in the form of long prisms if evaporated under an air-pump. A. J. Ph., Sept. 1877, p. 444; from Ber. Chem. Ges., 1877.

Sulphur Præcipitatum.—L. Siebold draws attention to the fact that if the quantity of hydrochloric acid is so regulated as to be barely sufficient to decompose all of the pentasulphide of calcium formed during the process, so that the mixture will retain slight alkaline reaction, the resulting preparation will be much superior to that obtained by the B. P. process, in which sufficient or almost sufficient hydrochloric acid is used for the complete decomposition of both the pentasulphide and hyposulphite. The product from the latter is coarser, heavier, and darker in color, and does not exhibit the same globular form under the microscope. Neither is it acted upon with equal energy by chemical agents. Prepared according to the author's suggestion the product amounts to about 55 per cent. of the sulphur used. It is a pale yellowish white, thoroughly uniform, fine powder, consisting entirely of perfectly round, smooth globules; it is sure to be free from arsenic, and can never contain any persulphide of hydrogen. Solution of chlorine dissolves it immediately, forming sulphuric and hydrochloric acids. The author believes that it will be more readily assimilated than the coarser, heavier, and less uniform preparation of the B. P., and therefore strongly recommends its preparation by partial precipitation, believing that the superiority will greatly outweigh the not inconsiderable loss of sulphur. Yearbook of Ph., 1876, p. 607.

Precipitated Sulphur.—Considerable discussion arose in England, some time since, with regard to the purity or impurity of the preparations called Lac sulphuris and Sulphur precipitatum. Both the British and the United States Pharmacopœia direct the precipitation of the sulphur from its lime compound by hydrochloric acid, but from the discussions mentioned, it appears that manufacturers (in England) frequently employ sulphuric acid in place of hydrochloric, thus introducing large quantities of gypsum, and increasing the quantity at the expense of quality. This latter product appears to be brought into commerce under the name of Lac sulphuris, in England, while the term "Sulphur Precipitatum" is presumed to be applied to the pure product, obtained with hydrochloric acid. H. H. Croft has now inquired into the condition of this preparation as it occurs in the Toronto markets. He found that, except in one store, there appeared to be no distinction made between a pure and an impure preparation. Fifteen samples were examined, of which six samples might be called pure, while the other nine contained quantities of sulphate of calcium varying from 12.65 to 61.52 per cent. In estimating the latter by the usual method, *i. e.*, the loss occasioned by heating, there is usually no compensation made for the loss of water of crystallization originally contained in the gypsum. The author draws attention to this fact, and in his tabulated records of the examinations he shows the difference in the results that are occasioned by such neglect. The correction to be made is, in round numbers, 21 per cent. of the residue found. This correction should be made in the results obtained by Mr. Dietrich, of Ann Arbor (see Proceedings, 1877, p. 241), who found only two pure samples out of eight that were examined. Can. Ph. Jour., Sept. 1877, p. 50.

Protochloride of Sulphur—Behavior with Fixed Oils.—Mercier has observed that by the addition of a small quantity of protochloride of sulphur to fixed oils, particularly the drying oils, a solid transparent mass is formed, which will retain such volatile liquids as bisulphide of carbon, petroleum benzin, etc., to a large amount, forming a glue-like non-pulverizable mass. See "Bisulphide of Carbon."

Anhydrous Sulphuric Acid.—At the works of Stark, in Bohemia—where the manufacture of "Nordhausen sulphuric acid" is conducted on such immense scale as to practically monopolize its manufacture—anhydrous sulphuric acid is now produced in large quantities. It enters commerce in well-soldered tinned-iron canisters. The demand for this acid is occasioned by the growth and development of the alizarine production, the yield of which is very materially increased by the use of oxidizing agents of high concentration. Ph. Centralh., Nov. 8th, 1877, p. 373.

Sulphuric Acid.—R. Weber has observed the formation of a new sulphuric hydrate. The new body is obtained by the gradual addition of English oil of vitriol to the ordinary anhydride. Care is necessary in the addition of the oil of vitriol, as too small a quantity hinders the deposition of the crystals formed on the cooling of the fluid, whilst too large a quantity promotes the formation of Mitscherlich's solid hydrate, H_2SO_4, SO_3 ($O = 16$). The body in question is at ordinary temperatures a viscous liquid, solidifying at from 8°–10° C. (= 45.4°–50° F), and possesses a density of 1.983. The analysis leads to the formula H_2SO_4, $3SO_3$ ($O = 16$), which requires a percentage of 94.69 SO^3. The author describes the method by which he has obtained the pure *sulphuric anhydride*, which, as prepared by him, is a very mobile colorless liquid at moderate temperatures, which solidifies on slow cooling to long transparent prismatic crystals like saltpetre, quite different from the ordinary anhydride. The crystals melt at 14.8° C (= 58.64° F.). Under certain circumstances the anhydride can, like sulphuric hydrate, be cooled to temperatures below its liquefying point without solidification, but then suddenly becomes solid. The anhydride shows the same composition after the lapse of a year, and retains the same melting-point as that freshly prepared. The author cannot, therefore, agree with the view sometimes taken, that isomeric modifications of the anhydride exist. J. Chem. Soc., Aug. 1877, p. 164; from Pogg. Annal.

Sulphuric Acid—Specific Gravities.—According to recent experiments of F. Kohlrausch, mixtures of sulphuric acid and water (weight per cents.) have the following specific gravities:

SO_4H_2.	Spec. Grav.	SO_4H_2.	Spec. Grav.
90	1.8147	96	1.8372
91	1.8200	97	1.8383
92	1.8249	98	1.8386
93	1.8290	99	1.8376
94	1.8325	100	1.8342
95	1.8352		

Ph. Centralh., June 20th, 1878, p. 226; from Ann. Physick. Chemie, 1878.

Sulphuric Acid—Boiling-Points.—G. Lunge has found the following boiling-points for sulphuric acid:

SO_4H_2, per cent.	Boiling-point.	SO_4H_2, per cent.	Boiling-point.
5	101° C	70	170° C
10	102	72	174.5
15	103.5	74	180.5
20	105	76	189
25	106.5	78	199
30	108	80	207
35	110	82	218.5
40	114	84	227
45	118.5	86	238.5
50	124	88	251.5
53	128.5	90	262.5
56	133	91	268
60	141.5	92	274.5
62.5	147	93	281.5
65	153.5	94	288.5
67.5	161	95	295

Ph. Centralh., June 20th, 1878, p. 226; from Ber. d. Deut. Ch. Ges., 1878, p. 370.

Commercial Oil of Vitriol—Estimation of Nitrogen Compounds.—The estimation of nitrogen compounds by the aid of oxidizing agents in commercial oil of vitriol gives, according to G. E. Davis, incorrect results, because of the presence of arsenious acid, and other compounds. He has found oil of vitriol to contain nitric oxide, nitrogen trioxide, nitrogen tetroxide, nitric acid, arsenious acid, arsenic acid, ferrous sulphate, organic matter, sulphurous acid, hydrochloric acid. These substances are, of course, not all contained in the same sample of oil of vitriol, but *nearly* all may be found in the same sample. Upon the basis of experiments made with every variety of oil of vitriol which he was enabled to obtain, the author recommends the following process, which was originally suggested to him by Dr. John Watts:

1 cc. of the vitriol is measured very accurately by means of a fine pipette, and introduced into Frankland's stopcock-tube, standing over mercury. By opening the stopcock the vitriol is allowed to run in, and the cup is washed out with pure strong vitriol, which is also run into the tube. The bottom is now closed with the thumb, and the vitriol agitated with the mercury in such a manner that an unbroken column of mercury always remains between the vitriol and the thumb. The reaction is complete in less than five minutes, and the tube being graduated, the mercury is levelled, and the volume of gas read off. For technical purposes this volume will be found accurate enough, but in cases where extreme accuracy is required the tube must be left to itself for several hours, the temperature and pressure noted, and the necessary corrections made.

The mercury reduces the volume of the oxides of nitrogen into nitric oxide, and the presence of any other compound in the vitriol has no influence on this test. The only precaution to be taken is to have the vitriol in the tube strong enough. It is rather a curious coincidence that when 1 cc. of vitriol is taken, the number of cc. of nitric oxide obtained, divided by ten, gives nearly enough the percentage of nitrous acid (N_2O_3) ($O = 16$). The author gives tabular statements of results obtained with various samples of oil of vitriol, both by this mercury process and the oxidizing process with permanganates, in which the latter process universally gives results which are too high. Ch. News, Feb. 1st, 1878, p. 45.

Sulphuric Acid—Volumetric Estimation in Waters.—It is sometimes important—for brewing for instance, and other manufacturing purposes—to find by an easy and ready method the exact amount of sulphuric acid in waters bound to alkalies, as well as that present as calcic and magnesic sulphates. P. Haubst gives a description of a volumetric method by which these determinations are readily accomplished with accuracy in a few hours. The process is divided into two operations :

1. *Estimation of Sulphuric Acid in the Alkaline Sulphate.*—Take 100 cc. of the water (if alkaline carbonates are present, neutralize with dilute hydrochloric acid); add a slight excess of baryta water; then pass in a current of carbonic acid gas, or mix it with water highly charged with this gas; let it boil a few minutes, and filter. The precipitate is washed with boiling water till the washings are neutral to test-paper, and the filtrate, which now contains the alkaline carbonates produced from the corresponding sulphates, is titrated with centinormal oxalic or sulphuric acid.

2. *Estimation of the whole Sulphuric Acid.*—The same number of cc. of the water being taken as in the first operation, it is raised to boiling, and carbonate of sodium is added until the liquid remains distinctly alkaline. It is then, after some minutes, ebullition, passed through a filter, and the filter well washed. All the sulphuric acid present is now in combination with potassa and soda; lime and magnesia salts having been converted into carbonates by the action of carbonate of sodium and filtered out. The author fails to explain, but it is evident that the further treatment of the filtrate is now precisely as that for the original water, as explained under 1. The difference in the quantity of sulphuric acid ascertained by the two operations, gives the quantity of sulphuric acid in combination with alkaline earths. Ch. News, Nov. 23d, 1877, p. 227.

Sulphuric Acid—Waste of Potassium.—In a former communication (see Proceedings, 1876, p. 214) Shearer Kestner has shown that during the industrial concentration of sulphuric acid in vessels of platinum, the quantity of this metal dissolved in acid free from nitrous compounds increases with the concentration of the acid. New experiments, undertaken for the purpose of preparing fuming sulphuric acid, have induced him to continue his observations. The action upon the metal, so much promoted by concentration beyond 95 per cent., is still further intensified with the concentration of monohydrated acid. On decomposing bisulphate of sodium by heat in earthen retorts, lined with platinum, 1 gram of metal was dissolved for each kilo of fuming acid produced. The metal is found in a soluble state mixed with the sulphate of sodium. Chem. News, June 7th, 1878, p. 237; from Compt. Rend., April 29th, 1878.

Persulphuric Acid—A New Oxy-Acid of Sulphur.—Berthelot has obtained a new oxy-acid of sulphur, the persulphuric, corresponding in composition to the permanganic and perchromic acids, and whose existence is conformable to the analogies drawn from a comparative study of the sulphates, the chromates, and the manganates. It may be obtained in the pure anhydrous state by causing the electric effluve, at high tension, to act upon a mixture of sulphurous acid and oxygen in equal volumes and absolutely dry. Concentrated sulphuric acid, under the same conditions, combines neither with oxygen nor with ozone. Persulphuric acid is also produced, though in a state of solution, during the electrolysis of concentrated solutions of sulphuric acid, under which conditions it has been hitherto confounded, either with oxygenated water or with that imaginary substance which has been called antozone. The same compound is also formed, but in a dissolved state, if a solution of oxygenated water is cautiously mixed with sulphuric acid, either concentrated or diluted with less than one equivalent of water. But combination does not ensue when the sulphuric acid is previously diluted with two equivalents or more of water. It is probable that persulphuric acid is produced also under various other circumstances, as when concentrated sulphuric acid acts at a low temperature upon alkaline or metallic peroxides and other oxidizing agents.

Persulphuric acid, as obtained by the author, is a thick adhesive liquid, which, when exposed to near 0° C. (= 32° F.) sometimes forms indistinct granular crystals, and sometimes slender, flexible, transparent needles, several centimeters in length. In its general appearance it resembles anhydrous sulphuric acid, but the latter may be distinguished by its opacity, and by forming much finer, shorter, and less lamellar crystals. Its composition, determined both synthetically and analytically, is S_2O_7. It may be preserved several days at a temperature bordering on 0° C. (= 32° F.), but in about a fortnight it shows signs of spontaneous decomposition. The aqueous solution is dissolved rapidly. The solution in sulphuric acid, though more stable, gradually gives off oxygen, and at the end of six weeks is completely destroyed. Heated over a flame persulphuric acid is at once decomposed into oxygen and anhydrous sulphuric acid. Its solution in sulphuric acid may be diluted with water without immediate decomposition. It oxidizes sulphurous into sulphuric acid. The author concludes that sulphur forms with oxygen a series of definite compounds, increasing in the following proportion :

S_2O — unknown; analogous to Cu_2O.
S_2O_2 — hyposulphurous acid.
S_2O_3 — unknown; analogous to Mn_2O_3.
S_2O_4 — sulphurous acid.
S_2O_5 — hyposulphuric acid.
S_2O_6 — sulphuric acid.
S_2O_7 — persulphuric acid.
S_2O_8 — unknown; analogous to Os_2O_8.

This series expresses all the possible molecular types of the simple compounds which oxygen forms with the other elements, The extreme limit in most of the known cases is reached by the acids which contain seven equivalents of oxygen, such as the perchloric, permanganic, etc. These super-oxygenated acids offer a remarkable analogy in their physical and chemical properties, amounting in some cases to isomorphism. They constitute a true chemical type, RO_7, in which seven equivalents of oxygen are associated with the most various elements.

The author is pursuing the study of the super-oxygenated acids of other elements. Ch. News, Feb. 15th, 1878, p. 73; from Compt. Rend., Jan. 1st, 1878.

Mineral Acids—A New Reagent.—Huber recommends a mixture of ferricyanide of potassium and molybdate of ammonium as a reagent for the presence of free mineral acids. Upon the addition of this reagent to liquids containing mere traces of sulphuric, sulphurous, hydrochloric, nitric, arsenic, phosphoric or phosphorous acids, etc., a red turbidity results, while with larger quantities of the acids a brown turbidity is produced. The color disappears on the addition of alkali in excess. Neither arsenious nor boric acid are affected by the reagent. Ph. Centr. H., Nov. 15th, 1877, p. 387.

SELENIUM.

Selenium.—The atomic weight of selenium has been the subject of a series of investigations and relative determinations by Otto Pettersen and Gustav Ekmann, and their observations are recorded in "Ber. d. Dent. Ch. Ges." (Sept. 1877). They fix it at 79.08, remarking that the first decimal place is certain, the second as near as can be attained. Chem. and Drug., Nov. 1877, p. 439.

Selenide of Zinc (ZnSe.)—J. Marcottet finds that when selen ium and zinc are heated together, they do not easily combine, the selenium floating on the zinc and gradually distilling off, leaving the zinc covered with a layer of yellow selenide. The selenide is more easily prepared by passing selenuretted hydrogen over zinc heated to redness in a porcelain tube; the combination is accompanied by the disengagement of a large quantity of heat. Thus prepared it is a yellow amorphous powder, which, when heated in a porcelain tube in a gentle current of hydrogen, is converted into reddish-yellow crystals, which are isomorphous with the corresponding telluride, being regular hexagonal prisms, with trihedral sumits. Their sp. gr. at 15° C. (= 59° F.) is 5.40.

Selenide of Cadmium (CdSe) may be prepared in the same way as the zinc compound, and forms dark-red, almost black crystals, which arrange themselves regularly, so as to produce striated laminæ in two directions at right angles to one another. Their sp. gr. is 5.80. When they are examined under the microscope between two Nicol's prisms, whose principal sections are crossed, it is seen that extinction of the light takes place when the striæ are parallel or perpendicular to the plane of polarization; in all other positions the crystals transmit yellow or red light. They do not, therefore, belong to the regular system like the preceding zinc compound or the corresponding tellurium compounds (which see). J. Chem. Soc., Nov. 1877, p. 571; from Compt. Rend., v. 84.

CHLORINIUM.

Chlorine—Influence of Various Salts when determining by Nitrate of Silver and Bichromate of Potassium. — Occasionally chlorine has to be determined in solutions containing arsenic, arsenious, phosphoric and fluorine compounds. H. Pellet has made experiments with a view to determine whether it is necessary to remove these compounds previous to such determination. To this end he proposed solutions containing 2 per cent. of each of the salts named. A few drops of solution of chromate of potassium were added to 10 cc. of such solution diluted with 20 cc. of water, and upon the addition of about 0.1 cc. of the silver solution, the red-colored silver precipitate made its appearance. This result evidences that chromate of silver is produced in such solutions before the corresponding fluoride, phosphate, etc., and the presence of these compounds in no way interferes with titration of chlorine by means of nitrate of silver and chromate of potassium. A series of controlling experiments fully support the results first obtained. When determining chlorine in ashes containing phosphates it is, therefore, not necessary to remove the phosphoric acid previous to such determination. Iodides and bromides react like chlorides. Ph. Centr. H., Nov. 22d, 1877, p. 396.

Commercial Hydrochloric Acid — Presence of Selenium. — Schlagdenhauffen finds that many brands of French hydrochloric acid contain *selenium*, to which their bad odor is partially due. New Rem., May, 1878, p. 148; from L'Union Pharm., 1878.

BROMINIUM.

Hydrobromic Acid.—Alexander Naumann has studied the behavior of bromine and bromide of sulphur to sulphuretted hydrogen, and has found that the action of sulphuretted hydrogen on bromine dissolved in water is unlimited. This is one of the usually recommended methods for preparing hydrobromic as well as hydriodic acids; but in the latter case—that is, when sulphuretted hydrogen acts upon iodine—the action terminates as soon as the solution is saturated with acid. In the case of hydrobromic acid, however, as soon as the solution is saturated, the acid escapes in the gaseous state. The aqueous solution formed at ordinary temperatures contained in a cubic centimeter: 1, after the first violent reaction, 1.06 grams of HBr; 2, after the addition of more bromine, and passage of more gas, until the liquid became colorless, 1.11 grams of HBr; 3, after a further addition of bromine, and when again colorless, 1.13 grams of HBr. In the last case, 1 cc. at 20° C. (= 68° F.), weighed 1.762 gram and contained: water, 0.58; hydrobromic acid, 1.13 (= 64 per cent.); and sulphuric acid 0.052 gram. The bromide of sulphur, which always forms in this process, removed from No. 3, contained, when dry, 60 per cent. of bromine; after washing with water, and standing for several days over lime and sulphuric acid, 56 per cent. of bromine. A continued stream of hydrobromic acid gas and a concentrated solution of the same may, therefore, easily be obtained by passing sulphuretted hydrogen into a solution of bromine in water* till the latter is saturated with hydrobromic acid gas: on further addition of sulphuretted hydrogen, the hydrobromic acid gas escapes and may be absorbed by water in a receiver. The bromide of sulphur may be decomposed by hot water and the solution used again in the next operation to dissolve the bromine. The only drawback in the preparation of hydrobromic acid in this way is the formation of traces of sulphuric acid from bromide of sulphur. New Rem., Sept. 1877, p. 267; from Ber. d. Dent. Ch. Ges., 1877.

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* Evidently water containing bromine in large excess is meant.—REP.

Hydrobromic Acid.—Dr. H. Hager communicates the following method for obtaining readily a concentrated solution of hydrobromic acid: 100 p. of crystallized hyposulphite of sodium, 50 p. of bromine, and 10 p. of water are introduced into a suitable flask, which is arranged for generating gases, and the gas is absorbed in 140 p. of distilled water, the delivery-tube dipping just beneath the surface. After a time the reaction is aided by gentle heat. The product is from 185–190 parts of liquid acid. Its specific gravity is 1.204. Ph. Centrh., Nov. 1st, 1877, p. 361.

Hydrobromic Acid—Preparation.—Dr. E. R. Squibb considers it desirable that hydrobromic acid should be of such bromine strength as to bear an easily remembered relation to a bromine salt selected as standard. The potassium salt being the most generally used he selects this as the standard. It contains, in round numbers, 68 per cent. of bromine, and hydrobromic acid to correspond with this salt weight for weight, would therefore also have to contain 68 per cent. of bromine. But an acid of this strength is inconvenient to make and dispense, while one of just half that strength—34 per cent.—is readily made, convenient to use, and its relation to bromide of potassium—2 to 1—is easily remembered. The formula and process for making the acid is as follows:

Take of bromide of potassium, six parts; sulphuric acid, sp. gr. at 60° F., 1.838, seven parts; water, nine parts. Add to the sulphuric acid one part of water and cool the mixture. Then dissolve the bromide of potassium in six parts of water by means of heat, supplying the loss of water by evaporation during the heating. Pour the diluted sulphuric acid slowly into the hot solution with constant stirring, and set the mixture aside for 24 hours, that the sulphate of potassium may crystallize. Pour off the liquid into a retort, break up the crystalline mass, transfer it to a funnel, and having drained the crystals, drop slowly on them two ounces of water, so as to displace and wash out the acid liquid. Add the liquid thus drained off and washed out, to that in the retort, and distil the whole nearly to dryness, or until nothing further distils off by moderate heating. The distillate will weigh about ten parts, and should contain about 37 per cent. of hydrobromic acid. Assay this by means of normal volumetric solution of soda, and add distilled water until it shall have the strength of 34 per cent. of hydrobromic acid. The product will weigh about eleven parts, and the loss of hydrobromic acid as calculated from the bromide of potassium will be about 1.2 per cent.

Solution of hydrobromic acid thus prepared is a limpid, colorless, odorless liquid, of strongly acid taste; sp. gr. at 15.6° C. (= 60° F.), 1.274; at 25° C. (= 77° F.) the sp. gr. is 1.257. It is free from sulphuric and sulphurous acid, and leaves no residue—or but an accidental trace—on evaporation. It consists of 33.4 per cent. of bromine,* about 0.6 per cent. of hydrogen, and 66 per cent. of water; or 34 per cent. of hydrobromic acid ($HBr = 81$) and 66 per cent. of water.

Many formulas that have been published for making this acid for medicinal uses are, in the author's opinion, either faulty and inaccurate, or difficult and impracticable for ordinary use. The various steps in his above process are described and elucidated with the author's usual thoroughness. The medicinal application of the acid is also considered to some extent. A. J. Ph., March, 1878, p. 116.

IODINIUM.

Iodine—Production in Peru.—The production of iodine from the mother waters of the Chili saltpetre—so-called—obtained in the Peruvian mines, threatens to destroy the industry of its production in Scotland from the varec or kelp. Since 1871, the production of iodine from the Peruvian source mentioned has been found profitable, and resulted in a steady decrease in the price of the product, until, in last February, *all* iodine manufacturers entered into an agreement to place *all* the iodine produced into *one* hand, whereby the price was raised to present figures. The yield of iodine from the Peruvian mines is, however, so considerable that Peru alone would be able to supply the demand of all nations, whence it may be concluded that in future years the price will be much lower. The Scotch monopolists, who at first ridiculed the news of the possible production of iodine from the Peruvian mother liquors, will possibly, in the near future, find it unprofitable to work the material that has so long constituted the exclusive source of that important agent. New Rem., Oct. 1877, p. 290; from Pharm. Handelsblatt.

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* While the slight difference between the atomic weights of Br and HBr, is of no practical import in the adjustment of the strength of this acid intended chiefly for medicinal use, the author is inconsistent in not carrying out his original proposition, and adjusting the strength to 34 per cent. Br.—REP.

Iodine—Detection of Traces.—E. Filhol recommends to extract the iodine in the usual manner, by evaporation with a little potassa to dryness, treating with alcohol, evaporating this solution, and redissolving the residue in a few drops of water; this is mixed with a few drops of muriatic acid, then with some chromic acid, and agitate with a little bisulphide of carbon, which acquires a violet color. .50 milligram of iodine may thus be detected. A. J. Ph., Dec. 1877, p. 598; from Zeitschr. Œst. Apoth. Ver. 1877.

Iodides and Iodates.—William Stevenson recommends the following practical process for making iodic and hydriodic acids and most of their salts: Dissolve 2 parts of baric hydrate in 4 parts of boiling water; add gradually 3 parts of iodine, and filter when the solution is neutral and colorless. *Iodate of barium* constitutes the precipitate, and iodide of barium remains in the solution. From these the respective acids and salts may be obtained by the application of sulphuric acid or sulphates. Ch. News, Nov. 2d, 1877, p. 201.

Iodide of Potassium.—Five different samples of iodide of potassium were examined by Eli L. Klopp. They all had an alkaline reaction, were free from bromide and chloride, but with the exception of one, contained traces of iodate. A. J. Ph., Nov. 1877, p. 551.

Hydriodic Acid—Action of Light.—G. Lemoine has found that dry gaseous hydriodic acid, while it may be kept in the dark for years, if air is excluded, is decomposed when exposed to light; but this decomposition—resulting in the separation of iodine and elimination of hydrogen—is very slow, even when the exposure is to direct sunlight. Aqueous hydriodic acid is not changed by the influence of light if air is absent; but in the presence of oxygen or of air, slow decomposition takes place in the light as well as in the dark. It is remarkable, that light exercises a stronger power to decompose the molecule of hydriodic acid than does heat. By exposure to light for four weeks, 80 per cent. of hydriodic acid gas could be decomposed, whilst exposure for the same time to a temperature of 265° C (= 509° F.) only 2 per cent. and to 440° C (= 824° F.) only 20 per cent. were decomposed. Ph. Centr. H., Nov. 22d, 1877, p. 396.

Chlorides of Iodine.—P. Schützenberger finds that the compounds ICl and ICl_3, are both decomposed by water, the products being iodic acid, hydrochloric acid, and a volatile yellow substance, having a powerful odor, and removable from the aqueous solution by agitation with ether. In the case of the monochloride there occurs also an abundant deposit of iodine. The author's observations lead him to the conclusion that the yellow substance is a compound of the monochloride of iodine and hydrochloric acid ($ICl\ HCl$). In the reaction of water on ICl, the quantity of the chloride decomposed is just so much as will furnish sufficient hydrochloric acid to combine with the remainder of the chloride to produce the compound, ICl, HCl. Trichloride of iodine may be regarded as formed of $ICl_5 + ICl$, and as the former yields with water only iodic and hydrochloric acids, the trichloride should furnish half its iodine to form iodic acid, and the other half to produce the compound, ICl, HCl, a result which the author has experimentally verified. J. Chem. Soc., July, 1877, p. 110; from Compt. Rend.

Monochloride of Iodine.—According to the experiments of W. Bornemann, pure monochloride of iodine, ICl, is decomposed by water with formation of hydrochloric and iodic acids, and liberation of iodine; a little monochloride of iodine remains, however, in solution. The monochloride dissolves in dilute hydrochloric acid without separation of iodine, and it is even possible to redissolve the iodine set free in the above reaction, by the addition of hydrochloric acid, this result being due to the action of hydrochloric acid on iodine.

When chlorine is passed into water containing known quantities of iodine till the whole of the iodine disappears, a separation of iodic acid takes place in concentrated solutions only. In solutions containing less than one part of iodine to one part of water, no such separation occurs. The whole of the iodine is converted into iodic acid only in solutions containing at least ten parts of water to one part of iodine. When chlorine is passed into concentrated solutions so long as it is absorbed, iodic acid and trichloride of iodine are deposited, and the supernatant red-brown liquid gives off trichloride of iodine in a vacuum. J. Chem. Soc., July, 1877, p. 110; from Ber. d. Deut. Ch. Ges.

Trichloride of Iodine.—A. C. Christomanos avails himself of the action of chlorine on hydriodic acid to obtain trichloride of iodine in a pure state and free from iodine. Pure hydriodic acid, obtained by adding iodine gradually to a mixture of amorphous phosphorus, with a few drops of water gently heated in a retort, is passed through a chloride of calcium drying-tube into a tall cylinder or flask filled with dry chlorine. At the first contact of the two gases a dense white cloud of hydriodic acid is formed, in which float innumerable golden-yellow spangles of trichloride of iodine. When the hydriodic acid is in excess, the fumes have a reddish-violet color, and the spangles of trichloride then assume a still more brilliant appearance. Generally, if the two gases are tolerably pure, the hydriodic acid takes fire in the chlorine. Violet fumes of iodine are then set free, which immediately combine with chlorine to form the brilliant golden-yellow crystals of trichloride, whilst the hydrogen burns with a bright-red flame in the iodine vapor. The sides of the cylinder speedily become covered with yellow crystalline scales of the trichloride. If after this the current of hydriodic acid be continued, the crystals assume a darker color, becoming orange and brown, owing to the following reaction: $HI, + ICl_3 = HCl + 2ICl$. Trichloride of iodine is a lemon to orange-yellow solid, very easily decomposable, and can only be preserved in an atmosphere of chlorine. In the air it volatilizes perceptibly, even at —12° C. (= +10.4° F.) but is less volatile, especially when cooled down to that temperature, in carbonic acid; though it still loses weight distinctly, and at the same time an odor of chloride of carbonyl ($COCl_2$) ($O = 16$) is developed. When heated to 100° C. (= 212° F.) in an open glass tube, it is instantly decomposed into free chlorine and monochloride of iodine, which latter boils rapidly at that temperature. In an atmosphere of chlorine the trichloride melts at 33° C. (= 91.4° F.). It dissolves in water. Strong sulphuric acid throws down from the aqueous solution a yellow powder, but the same acid dissolves the trichloride with a yellow color. It dissolves in potash, forming iodide, chloride, iodate, and chlorate. It emits dense white fumes in an atmosphere containing ammonia, and an excess of the latter immediately converts it into iodide of nitrogen, sal ammoniac, and iodide of ammonium. Benzin dissolves it with a cherry-red color; bisulphide of carbon immediately decomposes it, chloride of sulphur being formed; it oxidizes solutions of sulphurous acid, and of ferrous sulphate when boiled therewith. Potassium and phosphorus take fire in contact with it. The trichloride volatilizes in a current of hydrogen in the cold without acting upon it; but on gently heating hydrochloric acid and liquid monochloride of iodine are formed. Ibid., Aug., 1877, p. 163.

PHOSPHORUS.

Phosphorus—Solubility in Strong Acetic Acid.—It has been stated that *sulphur* (which see) was soluble in conc. acetic acid. Dr. Vulpius now finds that this acid also dissolves *phosphorus*. A hot extracted solution contains about 1 per cent., and the amount dissolved is in direct relation to the acid. On cooling the hot concentrated solution, only a minute trace of phosphorus separates, but by diluting with water, the whole of the phosphorus is separated. This solution emits phosphorescent light in the dark. New Rem., May, 1878, p. 148; from Pharm. Zeitung.

Phosphorous Acid—Preparation of the Crystallized Acid.—Grosheinz has applied with success the following modification of the usual process for preparing phosphorous acid, whereby he obtains the acid in a crystalline condition very rapidly and without the troublesome evaporation. The trichloride of phosphorus is heated to 60° C. (= 140° F.), and by the aid of a rapid current of air its vapor is passed through two flasks, each of which contains about 100 grams of water cooled to 0° C. (= 32° F.). At the expiration of about four hours, the water in the first flask is saturated with the trichloride, and a thick crystalline magma of phosphorous acid is produced. This is now caused to drain upon a funnel (stopped with asbestos) by the aid of a water vacuum pump; after which it is washed thrice with small quantities of water cooled to 0° C. (= 32° F.), and then dried in vacuo, when pure phosphorous acid results. The contents of the second flask, containing phosphorous acid resulting from the decomposition of trichloride which has passed the first flask undecomposed, is used as the first flask in the next operation. Free phosphorus, which it is difficult to remove completely from the trichloride, does not interfere with this method in any way. Ph. Centr. H., Sept. 20th, 1877, p. 307.

Phosphorous Acid—Preparation.—I. Corne recommends to partly immerse phosphorus in distilled water, and after several days' exposure precipitate the phosphoric acid from the liquid by the addition of ammonia, chloride of ammonium, and sulphate of magnesium. The filtrate is heated to expel excess of ammonia, and then mixed with acetate of lead, whereby sulphate, chloride, and phosphite of lead are precipitated. The precipitate is well washed, and digested at a moderate heat with acetate of ammonium, whereby the two former salts are dissolved, while the phosphite of lead remains behind, and after washing is decomposed by sulphuretted hydrogen. The solution is filtered, heated to expel H_2S, and now contains pure phosphorous acid. A. J. Ph., May, 1878, p. 258; from J. de Ph. et de Chem., Feb. 1878.

Hypophosphoric Acid (PO_4).—When phosphorus is exposed to slow oxidation in moist air, an acid liquid is formed, which is usually regarded as a mixture of phosphoric and phosphorous acids. Th. Salzer has now found that a third product is formed under these circumstances, which, having the composition of PO_4, is properly designated as hypophosphoric acid, and forming a sparingly soluble acid sodium salt, it is readily separated from the two accompanying acids named. The pure acid may be obtained by decomposing the recently precipitated hypophosphate of lead with sulphhydric acid, filtering off the acid liquid and boiling to remove excess of H_2S. The aqueous acid so obtained may be concentrated to a syrupy condition, but it is necessary towards the end to avoid a temperature above 30° C. (= 86° F.) The aqueous acid is colorless, odorless, and strongly sour, it keeps well, and possesses reactions intermediate between phosphoric and phosphorous acids, some of which are detailed in the author's paper. The author also describes some of its salts, and their reactions.

Acid Hypophosphate of Sodium (NaO,HO,PO_4+6HO), is obtained by adding a cold saturated solution of acetate of sodium to the syrupy acid mixture resulting from the oxidation of phosphorus under the conditions above named. The precipitate is washed, and further purified by recrystallization. It crystallizes in oblique rhombic tables, requires 45 parts of cold and 5 parts of hot water for solution, has an acid reaction, loses its water of crystallization when heated, and is decomposed at a higher temperature, hydrogen being given off and metaphosphate of sodium formed. It is permanent at ordinary temperature, and not efflorescent.

Neutral hypophosphate of sodium ($2NaO,PO_4+10HO$) is obtained by dissolving equivalents of the acid hypophosphate and carbonate of sodium, and evaporating the solution. The neutral salt crystallizes in fine silky-glistening feathery crystals, which, under the microscope, are shown to be six-sided columns. The salt loses water of crystallization readily on heating, but is permanent at ordinary temperature. It requires 30 parts of cold water for solution and is readily soluble in hot water. It has a slight alkaline reaction.

Hypophosphate of lead ($2PbO,PO_4$) is obtained by double decomposition between the acid sodium salt and either neutral or basic acetate of lead. It is a snow-white, anhydrous compound, insoluble in water, dilute acetic or hypophosphoric acids, but is dissolved by dilute nitric acid. Ph. Centr. H., Oct. 25th, 1877, p. 353.

BORON.

Boric Acid—Detection, Origin, and Formation.—L. Dieulafait states that spectrum analysis, under conditions laid down by him, permits the detection with certainty of the presence of $\frac{25}{10000000}$th of a gram of boron. The method with the hydrogen flame as described by the author shows distinctly $\frac{1}{1000000}$th of a gram. The presence of boric acid can be shown in a single drop of natural sea-water, of which it is a natural constituent. Contrary to what might have been expected boric acid concentrates itself in the last mother-liquors of the salt marshes, above the carnallite in the deliquescent salts, in the state of borate of magnesium. But it is exactly in that place and under these conditions that boric acid is met with at Stassfurth. The borate of magnesia of this celebrated deposit, therefore, is not, as commonly admitted hitherto, of volcanic origin, but is purely sedimentary. Ph. News, Oct. 19th, 1877, p. 182; from Compt. Rend., Oct. 1st, 1877.

SILICIUM.

Solution of Silicate of Potassium.—The following formula has been adopted by the Paris Pharm. Society: Purified carbonate of potassium, 78 degrees of alkalimeter, 36 grams; white Fontainebleau sand, fine and dry, 63 grams. The two substances are mixed and heated to a white heat in an elliptical reverberatory furnace for 4 hours. The resulting glass is transparent, very homogeneous, colorless, or at most only light-amber colored. To prepare the solution of this salt (which is intended for surgical purposes) the glass is coarsely powdered and introduced, together with a quantity of water sufficient to produce a solution of the density of 33° to 35° Baumé (sp. gr. 1294–1318), into an iron digester, capable of bearing a very high pressure. The water employed must be as pure as possible, and especially free from lime, to prevent the formation of silicate of calcium, which would render the product turbid and opalescent. The silicate of potassium is entirely dissolved, and the solution should have the above indicated density. New Rem., Sept. 1877, p. 284.

Glass wool is made up of finer filaments than any animal or vegetable fibres known, the diameter of its fibres measuring only 0.0004 to 0.00056 mm. It forms an excellent filtering material, but it should be freed, by means of acid, from the sulphur it contains in the form of sulphides. New Rem., Sept. 1877, p. 288.

Asbestos.—In a paper in *Iron*, Aug. 18th, 1877, attention is drawn to the varied uses to which this mineral is now being applied. Common asbestos, more or less fibrous, but of a powdery, brittle quality, is abundant in most countries, and begins to find its way into some of the industrial arts, but largely mixed with other material. The strong, long, fibrous sorts, varying in color from pure white to dark brown, thus far are only found in sufficient quantity for commerce in the Italian Alps, at elevations of several thousand feet, and often, for much of the year, buried under the snow. They occur in serpentine rocks, in irregular veins, usually very narrow, and requiring much heavy labor and blasting to open. Occasionally, but very rarely, masses are found in one lump, weighing several hundredweight. Notwithstanding the discovery of new and rich veins, the price of asbestos threatens to grow firmer, owing to new uses springing up for it, whilst Italian capitalists themselves begin to see the importance of a mineral, of which Italy has as yet a virtual monopoly, and are preparing to manufacture it on the spot where it is found into those goods which already find a steady and increasing demand. These are chiefly steam-packing in the rope or loose form for piston and pump-rods, and stuffing-boxes, and millbands for steam-joints, gaskets, man-hole plates, and a species of felting to cover boilers and steam-pipes. The ability of asbestos to resist an elevated temperature, moisture, friction and flame itself, joined to its lubricating quality, specially recommend it for these purposes. The chief objection to the manufacturer is that, when properly prepared and applied, it lasts too long. In America, asbestos lining or sheathing paper, for wooden houses, ceilings, floors, partitions, etc., to prevent the spread of flame, is attracting attention; the business being mainly in the hands of a Boston company, working under numerous patents. In Great Britain the business is chiefly centred in a flourishing Glasgow firm. In Paris it has begun to be adopted for civil and public registers in the form of fire-proof writing-paper. Patents have recently been taken out in America and England to cover its use as a fuel-bed for petroleum in any sort of stove or engine-furnace. Ph. J. Trans., Aug. 25th, 1877, p. 146.

CARBON.

Animal Charcoal—Action as a Reducing Agent at Low Temperatures.—W. Heintz has observed that when platinum salts are treated with animal charcoal, however carefully it may have been washed and reheated, these are precipitated by the charcoal. This is true not only for the platinum double salts with organic bases, but also for solution of pure bichloride of platinum, which, when allowed to stand in contact with the charcoal, becomes much lighter in color. By boiling it becomes lighter at once, and if the boiling is prolonged the solution becomes perfectly colorless, and now contains only muriatic acid, without the least platinum. The author found that this separation of platinum is decidedly due to reduction. In a platinum double salt, after treatment with animal charcoal, platinous chloride could be recognized along with the muriate of the associated base. It had, therefore, only lost platinum. Ferric chloride, when boiled with recently ignited animal charcoal, is reduced to ferrous chloride. Not a trace of carbonic acid is produced during the reaction, which cannot, therefore, be due to the carbon. It is the author's opinion that the reaction is mainly due to hydrogen, which is retained by the charcoal, even after the most thorough heating. Schweiz. Wochenshr. J. Ph., Aug. 24th, 1877, p. 274.

Charcoal (Animal?)—Power to Absorb Antimony and Arsenic from Acid Solution.—W. Skey had shown (Chem. News, March 27th, 1868) that charcoal, when freshly made or ignited, absorbs from their aqueous or acid solutions several substances not before known as being affected in this manner, and had proposed to apply this reaction to the purification of certain chemical reagents from substances difficult or tedious to remove by the processes now in use for this purpose. He has since then made further investigation in this direction, and finds that *antimony* and *arsenic* can be so largely removed from solutions of their oxides or chlorides in moderately strong hydrochloric acid (with a little tartaric acid in the case of antimony) by fresh charcoal, that neither of them can be detected therein by Reinsch's test, although before such process was applied both were abundantly evidenced to the test named. *Commercial sulphuric* and *hydrochloric acids*, diluted with a little water, can be purified from either of these substances by agitating them intermittently for a short time with fresh charcoal and then filtering off. Application of heat to the mixture expedites the result. The charcoal used does not appear to give up any portion of either antimony or arsenic when digested with aqueous solution of potash; hence it is considered very probable that it would absorb either of these metals from alkaline solutions also. Such charcoal, however, evolves antimoniuretted or arseniuretted hydrogen very perceptibly, when brought in voltaic contact with pure zinc in hydrochloric acid, and it can in this manner be wholly divested of these substances. The author had previously shown that *sulphur*, absorbed by charcoal, is by the voltaic treatment named evolved as hydride, and that hot aqueous solutions of potassa do not seem to remove the sulphur. Chem. News, July 6th, 1877, p. 6.

Coal-Gas—Two New Mercurial Products.—Lewis Thompson, in experimenting with purified coal-gas made from Newcastle-upon-Tyne coal, obtained two new mercury compounds: the one a brilliant red pigment, resembling, but differing from vermilion, for which he proposes the name *ponsœlion* (from the ancient Roman name of Newcastle-upon-Tyne, "Pons Allig"); the other an explosive compound, which the author proposes to name *cyanon*. The red pigment,

Ponsœlion, was proved to be produced from bisulphide of carbon, which the gas was known to contain in rather large proportion, and it is most readily produced directly from the latter. In the first experiment a set of Liebig bulbs were charged with a solution of caustic potash, in which a quantity of bicyanide of mercury had been previously dissolved and the coal-gas in question was then slowly passed through the bulbs with the following results: In a very few minutes the solution became milky, and this continued to increase for several days, with the deposition of a white precipitate, which, however, by a continuance of the experiment became first gray, then black, and at last a beautiful scarlet color, thus proving the existence of at least two, perhaps three, different compounds. Having determined that the scarlet compound derived nothing from the coal-gas, but from the bisulphide of carbon contained in it, the author finally determined the following ready method for its production: A strong solution of cyanide of potassium is boiled for several minutes upon binoxide of mercury. It is then mixed with three times its bulk of a very strong solution of caustic potash, allowed to cool, carefully decanted into a Florence flask, and a considerable quantity of bisulphide of carbon added to it with frequent agitation. The mixture assumes in rapid succession, a variety of tints, passing from white, yellow, brown, and gray, into black, and if then left at the ordinary temperature of the atmosphere, the black is changed into scarlet in the course of 24 to 48 hours; but this change may be effected in about half an hour if the mixture is heated in a water-bath at 110° F. The surplus bisulphide of carbon may be recovered by distillation; the pigment is collected, washed with hot water, and carefully dried. So obtained "ponsœlion" is a scarlet powder, of a very brilliant tint, which differs from vermilion so slightly that the two substances are very liable to be confounded with each other. It differs, however, from the latter in its composition, which though not absolutely determined, appears to consist of one atom of mercury (202), three atoms of sulphur (48), one atom of carbon (6), and one atom of hydrogen (1); and this composition leads to the conclusion that "ponsœlion" is a hydroerythrite of the protosulphuret of mercury. When sublimed in a small glass tube "ponsœlion" forms a jet-black mass, frequently containing numerous metallic spangles that strongly resemble antimony or tellurium, although it becomes red when finely powdered. Sublimed vermilion retains its red color. The tint of "ponsœlion" is not so purple as that of vermilion, and is pronounced by a very eminent portrait painter "the nearest approach to the natural hue of the European countenance." It is, therefore, likely to come into general use as a pigment. The explosive compound:

Cyanon, has not been completely investigated. It is the white precipitate which is first formed when coal-gas is passed through the alkaline solution of bicyanide of mercury, and if the process is arrested at that point, may be obtained in the usual way of washing and drying, and then constitutes a gray-white powder. On application of heat it explodes with great violence, and it requires, therefore, to be examined with great care. It has not been analyzed, but in all probability consists of two distinct substances, one containing sulphur and the other cyanogen, united to some form of hydrocarbon. The cyanogen compound has been transferred by the author from the mercury to copper, and this copper compound has explosive qualities equal to the mercurial compound. It appears likely that this copper compound is formed in old gasmeters, and that to this the frequent explosions, by soldering them, is due. Chem. News, March 8th, 1878, p. 95.

Bisulphide of Carbon—Behavior in contact with Hydrate of Potassium.—T. A. Edison has observed, that when bisulphide of carbon is allowed to remain in contact with two parts of hydrate of potassium in pieces, for several months and in a close vessel, an intensely red, syrupy liquid is formed, which contains scarcely any traces of free bisulphide of carbon. Ph. Cent. H., Dec. 27th, 1877, p. 445.

Bisulphide of Carbon—Method of Gelatinization.—Mercier has observed that fixed oils, more particularly the drying oils, when mixed with a small quantity of protochloride of sulphur, form a solid transparent mass, having nearly the elasticity of caoutchouc. If, at the moment of mixing, a volatile liquid, soluble in the oil, be added, the solid mass will retain that liquid. Less than 10 per cent. of the chloride of sulphur should be used to obtain a glue-like non-pulverizable mass, which will retain 70 per cent. of bisulphide of carbon; but by increasing the chloride the mass will assume the aspect of horn, and be so friable as to be easily reduced to powder by rubbing between the fingers, while at the same time the largest portion of the volatile liquid is given off. Boiled linseed oil is best adapted for these purposes. A. J. Ph., Sept. 1877, p. 443; from Rép. de Pharm., May, 1877.

Bisulphide of Carbon—Application as Disinfectant.—The application of bisulphide of carbon as a disinfectant has already been referred to in last year's report (see Proceedings, 1877, p. 250). F. Kœnig recommends a lamp for the combustion of the CS_2, constructed as follows: A two-necked Woulff's bottle is provided with a glass tube, passing through a cork in the central tubulure to near the bottom of the bottle, and carrying a cotton wick; the other tubulure answers for the purpose of introducing the CS_2, and is closed with a cork carrying a glass-tube bent at right angles, the open end of which is as remote from the flame as possible. When using the lamp, it is three-quarters filled with CS_2, and lighted at the wick, when an abundance of SO_2 is generated. Its use is not attended with danger, if the tube, carrying the wick, reaches nearly to the bottom of the Woulff's bottle. Ph. Centrh., No. 13, 1878, p. 119.

CYANOGEN.

Anhydrous Hydrocyanic Acid.—De Girard draws attention to the fact, that the chloride of calcium, used to dehydrate the acid, must be absolutely neutral and free from caustic lime; otherwise, owing to the presence of water, formate of calcium and ammonia are formed; and the last named, passing over with the anhydrous acid—as cyanide—soon causes the decomposition of the acid. Arch. Ph., July, 1877, p. 94.

Hydrocyanic Acid—Delicate Reaction.—Prof. R. Böttger draws attention to the following delicate reaction, whereby the non-preëxistence of hydrocyanic acid in bitter almonds, plum-, cherry-, or peach-kernels, can be demonstrated conveniently as a lecture experiment. A few freshly pounded bitter almonds are introduced into a glass globe of about two liters capacity, and a long strip of Swedish filtering-paper, previously saturated with tincture of guaiac resin (5 grams to 100 cc. alcohol), dried, and drawn through a very dilute solution of sulphate of copper (1 × 2000) is suspended in it. The white strip of paper remains perfectly unchanged; but as soon as a pounded bitter almond, heated with a little water, is introduced into the globe, the strip of paper assumes an intensely blue color, owing to the action of the hydrocyanic acid formed. Ph. Centralh., No. 24, 1878, p. 195.

Cyanide of Potassium—Composition of the Black Body formed during its Preparation by Heating the Ferrocyanide.—A. Terreil has analyzed the black body formed when ferrocyanide of potassium is heated to redness for some time, and finds it to have the following composition: 32.05 metallic iron; 27.56 magnetic oxide of iron; 27.49 uncombined carbon; 0.24 carbon in form of cyanogen; 0.81 potassium; 0.29 nitrogen; 10.50 oxygen, = 100.00 parts. The composition may vary according to the time employed in heating the mixture, but carburet of iron is never formed. The generally accepted view, that the compound is a carburet of the composition FeC_2, is, therefore, incorrect. Zeitschr., Œst. Ap. Ver., Sept. 10th, 1877, p. 425.

Ferrocyanide of Potassium—Preparation from Sulphocyanide.—Br. Alander has succeeded in converting the sulphocyanide of ammonium, which is a large by-product in English gas-works, into ferrocyanide of potassium. The sulphocyanide is mixed intimately with double equivalents of potassa, carbon, and iron-filings, the whole is mixed with oil, and heated in a crucible to a strong red heat. The reaction is ended, when, on lifting the cover of the crucible, blue flames no longer appear. The crucible is then removed, and when cool, the mass is extracted with water after the addition of recently precipitated hydrated ferrous oxide. The solution is free from sulphocyanide, and yields ferrocyanide corresponding to 40 to 60 per cent. of the sulphocyanide employed. Ph. Centralh., No. 15, 1878, p. 137.

Ferrocyanide of Potassium—Application to Analysis.—Gaston Bong finds that the ease with which ferrocyanide of potassium is converted by chlorine into ferricyanide, makes it available for chlorine determinations in the same manner as arsenious acid. He uses for this purpose a normal solution containing 37.765 grams of the salt to the liter, which quantity corresponds to one liter of chlorine; the solution is diluted with water, colored with a few drops of indigo-solution, and the liquid containing chlorine is then added until the blue color is changed to the brown of the ferricyanide. The result is quite satisfactory, and is not influenced either by the degree of dilution or acidity. Conversely the method may be used to determine the purity of the ferrocyanide. Ferrocyanide of potassium may furthermore be employed advantageously in acidimetric tests, either as reducing agent or as precipitant; *e. g.*, for the determination of all the alkali in a chlorinated liquid, as in Javelle's liquor. This is treated with ferrocyanide of potassium in excess, then with a known quantity of acid, and the excess of the latter is then determined with solution of soda in the usual manner. The end of the reaction is readily recognized if a trace of ferric chloride is added to the liquid, the blue color produced by this changing to brown when the point of saturation is reached. In some instances tincture of litmus cannot be used as indicator, partly on account of the color of the liquid to be tested, and partly because it occasions precipitates with metallic salts. The litmus can, however, be made available by first precipitating the metals with ferrocyanide of potassium. This may be necessary in acid solutions of copper, zinc, etc. Arch. Ph., Nov. 1877, p. 424; from Bullet. Soc. Chim. de Paris.

Ferricyanides—Oxidizing Power.—Gaston Bong draws attention to the powerful oxidizing properties possessed by ferricyanide of potassium and especially by the metallic ferricyanides. This power may be evidenced by the aid of reducing agents which are capable of forming coloring matter, *e. g.*, aniline salts, which are oxidized in a few seconds, and in the cold, to black, emerald-green, brown, orange, according to the metallic ferricyanide employed. While the presence of an alkali is advantageous, a large excess, either of alkali or acid prevents or slackens all of these oxidations. The ferricyanides of zinc, copper, mercury, are the strongest oxidizers; they produce aniline black immediately at the ordinary temperature. All metallic ferricyanides produce this effect by the aid of heat. From the precipitates produced, the pure coloring matter may be extracted by means of alkali or acid.

The author employed a solution of ferricyanide of iron (the brown liquid obtained by mixing solutions of ferricyanide of potassium and of a ferric salt) for observing the oxidizing action on other bodies than aniline. In such a solution, sugar, alcohol and glucose produce, in the cold, a brown precipitate. A green precipitate, which possesses all the properties of the green cyanuret of Pelouze, is rapidly produced by animal tissues, such as silk and wool, and more slowly by oils, gums, starch, formic acid, uric acid and arsenious acid. The more powerful reducing agents, such as hydrocyanic acid, gallo-tannic acid and other tannins, aniline, wood-fibre and animal membrane form Prussian blue in a few moments; methylic and amylic alcohol, benzin (benzole? Rep.), glue, and cotton, act similarly but not permanently. This seems to indicate that these substances reduce only on account of the presence of foreign bodies, and it is possible that the ferricyanide may serve the purpose of establishing their purity. The strongest reducing agents, such as the sulphites and sulphides, precipitate Prussian blue immediately. The insoluble sulphides, even the native ones, such as those of iron, zinc, tin, antimony, arsenic, copper, lead, are energetic compared to the before-named substances; the metals, such as iron, zinc, lead, copper, aluminium, react similarly. The reducing action of all those agents is greater under the influence of heat. The readiness with which silk and wool reduce the above-named mixtures, enables the dyeing of their fabrics with ease; a green tint is obtained, which by the further action of reducing agents becomes handsome blue. The production of the blue color can be combined with other colors, requiring oxidation for its production, as catechu, indigo, etc. Arch. Ph., Nov. 1877, p. 425.

Prussides—New Class of Compounds.—Gaston Bong finds that when yellow prusside of potassium is treated with chloric instead of nitric acid, the same reactions are manifested; there is, however, no nitroprusside formed, but a new compound, approximating to it in its characters, is obtained. To obtain it, equal parts of yellow prusside of potassium and chlorate of potassium are covered with water, and sulphuric acid is added, in small portions at a time, until the blue color resulting after each addition is permanent and appears saturated. Upon now heating, the blue color at first remains, but soon gives place, under lively solution of gas, to black, and the mixture thickens. Water is now added, the mixture is accurately neutralized with carbonate of sodium, heated to boiling and filtered; the filtrate is deeply colored, and on dilution with water is purple-violet. When evaporated, sulphate of sodium is first deposited, and the mass then congeals. If this mass is now treated with a little water, a syrupy liquid is formed, from which black crystals are separated on evaporation in vacuo, the yield being tolerably abundant. The dry crystals are black, readily soluble in water, forming a violet-colored solution; alcohol only dissolves traces. The salt is permanent, even in solution; it forms dirty green, more or less dark precipitate with metallic salts, even with zinc salts, whereby the new compound is plainly distinguised from the ferricyanide. It is doubtless an energetic oxidizing agent, especially in the presence of metallic salts. By nitric acid it is readily converted into nitroprusside; alkaline sulphides change the deep violet color to yellow. Regarding its composition, the author is still in doubt, but he believes it to be a compound which corresponds to the nitroprusside, and in which the nitric oxide of the last-named compound is substituted by cyanogen. According to this view the new compound is the third member of the series.

$FeCy_6K_4$ — yellow prusside.
$FeCy_6K_3$ — red prusside.
$Fe_2Cy_{12}K_4$ — black prusside,

which is capable of forming the nitroprussides,

$Fe_2\,Cy_{10}(NO)_2K_4$

and the nitrosulphides,

$Fe_2S_5(NO)_2K_4$ (Roussin).
$Fe_2S_4(NO)_4K_4$ (Porczinski).

Arch. Ph., Nov. 1877, p. 328.

Persulphocyanic Acid.—R. W. Atkinson has made some experiments on this acid compound, the constitution of which still remains a matter of uncertainty, with a view to throwing some further light upon its properties. The acid was prepared in the usual way by passing a current of hydrochloric acid through a saturated solution of sulphocyanate of potassium. The thick yellow magma formed was thoroughly washed with water, and then, for further purification—simple washing with cold water as directed in most textbooks being insufficient for this purpose—it was recrystallized from boiling aqueous solution. This is a very troublesome process, since the acid is but sparingly soluble in boiling water. The acid crystallizes from hot water in long and often curved, woolly tufts, presenting a remarkable appearance. After drying in air, these crystals do not lose more than a mere trace of moisture when heated to 120° C. (= 248° F.) in an air-bath. In contact with cold water these crystals do not affect blue litmus-paper, but when the liquid is warmed the paper becomes faintly reddened, the color increasing in intensity as the boiling is prolonged, and the liquid now gives slight evidences of the presence of sulphuric acid. Persulphocyanic acid dissolves to a slight extent in cold alcohol, forming a distinct yellow solution, and is more soluble in hot alcohol. One liter of alcohol of 89 per cent. dissolves at 12.5° C. (= 54.5° F.) 1.58 gram, and at the boiling-point 12.774 grams. By *nitrate of silver* a light-yellow precipitate is produced in warm aqueous solution of the acid, which almost immediately becomes orange-yellow, and afterwards passes through various shades of orange to black. If a cold alcoholic solution of the acid be employed, the precipitate remains undecomposed for a much longer time, but is finally changed like the first. Ammonia dissolves the yellow precipitate, producing a dark-brown solution, which is reprecipitated by the addition of nitric acid. *Mercurous nitrate* produces with the acid a light-yellow precipitate, which is insoluble in cold nitric acid, but on heating dissolves with effervescence, leaving a white precipitate, soluble in aqua regia, and not blackened by ammonia. *Solution of iodine*, when heated with the acid, becomes decolorized, producing at the same time an orange-red precipitate. This is soluble to some extent in water, and yellow crystals are deposited, which have already been alluded to by A. Fleisher, but they contain apparently no iodine. They possess, indeed, the appearance of ordinary persulphocyanic acid, and perhaps are produced by decomposition of the iodine precipitate. The author details, at some length, his experiments made with a view to determine the composition of the silver precipitate, but he has not arrived at any definite results whereby either the constituents of these, or of the acid, could be arrived at. He is engaged in further experiments in the same direction. J. Chem. Soc., Sept. 1877, pp. 254 to 260.

Sulphocyanate of Melamine.—Ad. Claus finds that when sulphocyanate of ammonium is quickly heated to 250° C. (= 482° F.), and maintained at that temperature until the whole mass becomes solid, the interspaces of the crude melam formed are filled with a fine white sublimate, in the form of small prisms, which can be dissolved out by warm water. On cooling the solution, prismatic crystals, generally of a faint yellowish color, are deposited, which are soluble in alcohol, and may be sublimed without change by careful heating. These crystals constitute sulphocyanate of melamine ($C_3H_6N_6$,CNSH O = 16). J. Chem. Soc., Sept. 1877, p. 309; from Ber. d. Deut. Ch. Ges.

Nitroprussides—Action of Alkaline Sulphides.—Gaston Bong finds that the unstable purple body, produced by the action of alkaline sulphides upon nitroprussides, may be rendered somewhat stable if it is, immediately after its formation, precipitated by a metallic salt, especially zinc salt. By the latter it is separated as a rose-red compound, which, collected and dried at the ordinary temperature, constitutes a lake, which keeps well in the cold and may be used for coloring paper. It is destroyed by heat. Arch. Ph., Nov. 1877, p. 428.

Hydroplatinocyanic Acid.—In their paper on platinocyanide of thallium (which see under Thallium) R. J. Friswell and A. J. Greeaway give the following method by which they obtained pure "hydroplatinocyanic acid:" Platinous chloride is dissolved in cyanide of potassium; the resulting crystals are dissolved in water and precipitated as platinocyanide of copper by the addition of sulphate of copper. The copper salt is carefully washed, boiled with excess of hydrate of baryta, the solution filtered from cupric oxide, raised to the boiling-point, and a current of carbonic acid passed through it. It is then filtered from carbonate of barium and the platinocyanide of barium crystallized. The crystals of the latter are dissolved in water, and dilute sulphuric acid cautiously added to the boiling solution as long as a precipitate is occasioned—this being a most troublesome process, as it is not easy to see the point at which complete precipitation of the sulphate of barium occurs, while the least excess of sulphuric acid causes serious decomposition of the hydroplatinocyanic acid when the solution begins to be concentrated. The sulphate of barium is removed by filtration, the filtrate evaporated to dryness, extracted with ether, and the ethereal solution on evaporation deposits orange-red crusts of hydroplatinocyanic acid. J. Chem. Soc., Sept. 1877, p. 252.

POTASSIUM.

New Potash Fields.—The discovery of another immense bed of potash salts, near Stassfurth, is announced by *Iron*. It appears that the Continental Diamond Rock-boring Company, having some of its machinery unemployed, made some speculative borings at Aschersleben to ascertain the limits of the Stassfurth deposits. The borings proved the existence of thick beds of potash and soda salts, supposed to be the residue of the evaporation of an inland sea, lying within the triangle formed by the three towns of Magdeburg, Halle, and Nordhausen. Very liberal terms are granted under the Prussian laws to mineral explorers, and the managing director is said to have secured for the prospecting company the concession of an area of nearly twenty-four million square meters of land. It is intended to commence operations forthwith. Ph. J. Trans., Dec. 8th, 1877, p. 449.

Potassium Salts—New Reagent.—Ad. Carnot prepares a reagent for potassium salts as follows: 0.5 gram of subnitrate of bismuth is dissolved in a few drops of hydrochloric acid, and 1 gram of hyposulphite of sodium in a few cc. of water; the two solutions are mixed, and when mixed with a large quantity of alcohol, constitute a reagent, which produces a yellow precipitate in solutions containing potassium salts, while those undissolved are colored yellow. The reaction is not interfered with by other bases, with the exception of barium and strontium; but these latter are readily removed. The reagent may also be applied to the quantitative determination of potassium salts. Ph. Centralh., Nov. 5th, 1878, p. 43.

Chlorate of Potassium—Poisonous Action.—G. W. Kennedy reports the case of a child, two and a half years old, that died from the effects of about half an ounce of chlorate of potassium, taken while at play among the medicines in her father's (a country physician) office. There appears to have been no other medicines exposed so that the child could reach them. The author also learned of a case in which a young man, eighteen years old, suffering from sore throat, was treated with chlorate of potassium in five-grain doses, and from the time the first dose was taken, suffered from gastritis, vomiting freely after each dose. He was relieved from the time he ceased to take the medicine. It does not appear that the medicines had been subjected to chemical examination in either case. A. J. Ph., March, 1878, p. 112.

SODIUM.

Caustic Alkali—Determination in Presence of Alkaline Sulphides and Carbonates.—The following process, well adapted for the analysis of ball soda, is given in "Liebig's Annalen der Chemie" (vol. 190, No. 1 and 2): The weighed sample is ground up under alcohol till the caustic alkali is dissolved, heat being applied if necessary, and to the cold concentrated solution bisulphide of carbon is added. The liquid is largely diluted with water; the alkaline sulphides and sulpho-carbonates are removed by the addition of solution of lead or zinc, avoiding excess, when the caustic alkali may be calculated from the quantity of xanthogenate found. Ch. News, Feb. 22d, 1878, p. 83.

Sal-soda—New Process of Direct Preparation from Common Salt.—Ed. Bohlig communicates a method for the industrial production of sal-soda, which is dependent on the following reactions:

1. When 2 equivalents of oxalate of magnesium, 1 eq. of chlo-

ride of sodium (in concentrated solution), and 1 eq. of hydrochloric acid are mixed, a crystalline deposit of binoxalate of sodium and a syrupy solution of chloride of magnesium are formed; the crystalline deposit of binoxalate of sodium is then washed to remove chloride of magnesium, and then further treated in the moist condition.

2. If the magma of binoxalate of sodium is now treated with 2 equivalents of carbonate of magnesium, in the presence of water, and *in a close vessel*, in which the contents are kept in continual agitation, the binoxalate of sodium is converted into bicarbonate, and oxalate of magnesium is regenerated, and may be readily recovered.

3. If the solution of bicarbonate of sodium is now boiled for a short time with an equivalent of magnesia, sal-soda is obtained in solution, and carbonate of magnesium is produced, which, being quite dense, is readily separated from the solution of sal-soda.

4. The solution of magnesium formed during the first stage of the process (1) yields hydrochloric acid and magnesia when it is evaporated to near dryness in iron kettles, and then subjected to distillation, in an ordinary soda furnace, at a moderate temperature. The hydrochloric acid is collected by suitable means, and the magnesium remains in a nearly pure and dense form, in which condition any undecomposed chloride is readily removed by washing.

5. One-half of the magnesia so regenerated is converted into carbonate during the conversion of bicarbonate of sodium into sal-soda (3); the other half is so converted by spreading it moist on frames contained in large closets of wood, through which a current of carbonic acid—generated by a coke fire—is allowed to pass. The two equivalents of carbonate of magnesium, so regenerated, are now again ready for the decomposition of the binoxalate of sodium (2).

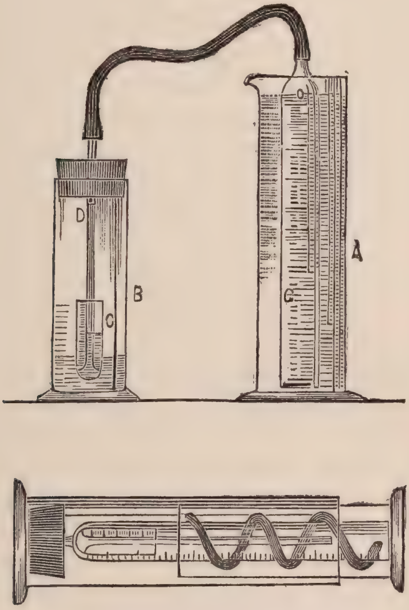
It will be observed that the materials necessary for the conversion of chloride of sodium into sal-soda are continually reproduced during the various stages of the process, so that the expense is reduced simply to the labor, fuel, wear and tear, and interest on capital employed, together with a slight loss occurring from unavoidable waste. Ph. Centralh., Oct. 4th, 1877, p. 330.

Alkalimetry—A New Indicator.—W. v. Miller has found "Tropæoline," a new coloring agent, discovered by O. Witt (and manufactured by Williams, Thomas & Dower) to be an excellent indicator in alkalimetry. Its solutions are changed from yellow to a *crimson* color by sulphuric and other mineral acids, as well as by some organic acids, particularly oxalic. The substance may, therefore, be used as an indicator, in place of litmus, over which it possesses the great advantage that it is altogether indifferent to *carbonic acid*, enabling the titration of all carbonates without heating. 2 cc. of a tropæoline solution containing 0.05 per cent. are added to 50 cc. of the alkaline liquid to be titrated, and the standard acid is added until the yellow color suddenly changes to carmine. New Rem., May, 1878, p. 149; from Ber. d. Deut. Ch. Ges., 1878.

J. T. Dunn reviews the various indicators, such as litmus, aurin (rosolic acid or corallin), phenol-phthalein, fluorescin, cochineal, logwood, hæmatoxylin, alizarin, ferric salicylate, potassic sulphindigotate, Prussian blue, etc., that are used in alkalimetry, and makes some practical observations on their applicability and uses. Ph. J. Trans., June 22d, 1878, p. 1030.

Rapid Estimation of Acids, Alkaline Carbonates, etc.—Dr. G. Noel publishes a convenient method for rapidly estimating acids, alkaline carbonates, and urea, which depends, in the first two cases, upon the liberation of a quantity of carbonic acid gas from the mixture to be introduced into the apparatus (Fig. 69). The latter consists of two parts: 1. A mixing vessel, B, graduated into cubic centimeters, and a small receiver, C, likewise graduated and provided with a central open tube, ending at D, the chief use of which is to retain the receiver in an upright position. 2. A taller vessel, A, filled with water or another liquid, into which is immersed an elongated bell-glass, the pointed end of which is connected by rubber tubing with the glass tube passing through the stopper of the mixing vessel. When using the apparatus, the reagent is placed into the mixing vessel, B, the substance to be assayed is introduced into the smaller tube, C, and the larger vessel, A, is filled either with pure water, if urea is to be assayed, or with water covered with a thin layer of petroleum or oil, in the case of carbonates, in order to prevent the absorption of carbonic acid gas by the water. The application of the apparatus is very simple. A weighed quantity of carbonate, for instance, in solution, having been introduced into the small tube, the outer vessel is charged with dilute sulphuric acid more than sufficient to decompose the carbonate; the mixing flask is inclined, whereby the two liquids mix, and the carbonic acid gas is liberated, which displaces a portion of water in the bell-glass. The latter is gradually lifted out of the water, until, at the end of the reaction, the level, both inside and outside of the bell-glass, is equal. If the water has reacted, before the experiment to the mark 0—which in all cases must be assured—the number of cc. from which the gas has displaced the water corresponds to a certain weight of carbonic acid gas, which is conveniently ascertained from tables accompanying the instrument. For the estimation of acids an excess of carbonate is used; for the estimation of urea, an excess of hypobromite (see Urea); the tables here also giving the result, based upon the quantity of water displaced. New Rem., March, 1878, p. 75; from Rép. de Pharm., 1877, No. 22.

FIG. 69.



Apparatus for Estimation of Acids, Alkalies, etc.

Hypophosphite of Sodium—Formula of the Pharm. Society of Paris.—Dissolve 10 p. of hypophosphite of calcium and 16 parts of crystallized carbonate of sodium separately in lukewarm water, and mix the two solutions, taking care that there be finally no excess of either salt present. Filter from the precipitated carbonate of calcium, wash the latter, add the washings to the filtrate, and concentrate on a water-bath at a temperature of 60° C. (= 140° F.) to avoid explosion. The dry residue must be preserved in tight vessels. It is a white, amorphous, or crystalline salt, deliquescent, soluble in 2 parts of water and in 15 parts of 90 per cent. alcohol. It possesses the characteristics of the hypophosphites and sodium salts. New Rem., Sept. 1877, p. 285.

Hyposulphite of Sodium—Solubility in Oil of Turpentine.—T. A. Edison has found that considerable quantities of hyposulphite of sodium are dissolved by oil of turpentine. The crystals, when immersed in the oil for several weeks, melt, and on shaking disappear in the liquid. The odor of the oil of turpentine has then almost completely disappeared. Ph. Centralh., Dec. 27th, 1877, p. 445.

Neutral Sulphite of Sodium—Formula of the Pharm. Society of Paris.—Prepare a concentrated solution of pure crystallized bicarbonate (carbonate? Rep.) of sodium (1 p. of salt to 2 p. of water); divide it into two equal portions, saturate one portion with sulphurous acid gas until the latter ceases to be absorbed. Add the reserved half to this, and boil to expel excess of gas. The solution now contains an entirely new sulphite, which is obtained in crystals by evaporation. The salt must be kept protected from the air. It forms oblique rhomboidal prisms, is very soluble in water, and most at 33° C. (= 91.4° F.). Above this temperature it deposits crystals of neutral anhydrous sulphite. Its solution, if slightly alkaline, slowly oxidizes in the air. 100 cc. of a solution containing 1.26 grams of the pure salt in a liter, mixed with starch paste, absorb 10 cc. of a solution of iodine, containing 12.7 grams per liter, before exhibiting a persistent blue color. New Rem., Sept. 1877, p. 285.

AMMONIUM.

Ammonia—Sp. Gr. of its Aqueous Solutions.—O. Wachsmuth, in view of the contradictory statements of the sp. gr. of aqueous ammonia of different strength, has by a series of very carefully conducted experiments obtained results upon which the very complete table below appended is based. An ammoniacal solution of the greatest possible strength was prepared by saturating water at 0° C. (= 32° F.) with gaseous ammonia. 100 cc. volumes of water were increased to 203 cc., and the product had, at the temperature named, a sp. gr. of 0.866. Saturated with pure HCl evaporated and dried at 120° C. (= 248° F.), this yielded 149.7 per cent. of hydrochlorate of ammonium. The liquid contained 47.55 per cent. of gaseous ammonia, or 1 gram of water had absorbed 0.906 grams = 1193 cc. ammonia. When it was heated in a well-stoppered flask to 10° C. (= 50° F.) ebullition occurred on the removal of the stopper, and its sp. gr. increased to 0.870. The above-named concentrated aqueous ammonia was used in the experiments. The ammonia was determined as hydrochlorate, being passed from the pipette into excess of hydrochloric acid to avoid loss by evaporation; and these determinations were confined to the dilutions having sp. gravities increasing by 10 to the 1000, *i. e.*. dilutions of sp. gr. 0.870, 0.880, 0.890, etc., to 0.990, the intermediate specific gravities being subsequently obtained by calculation:

TABLE

Of the Strength of Aqueous Solutions of Ammonium.

Spec. Grav. at 12° C. (= 53.6° F.)	1 Kilogr. contains Ammonia in grams.	1 Liter contains Ammonia in grams.	1 Liter is composed of: Water in cc.	Liquefied Ammonia in cc.
0.870	384.4	334.5	535.5	464.5
0.872	376.9	328.6	543.4	456.6
0.874	369.4	322.8	551.2	448.8
0.876	362.0	317.1	558.9	441.1
0.878	354.6	311.3	566.7	433.3
0.880	347.2	305.5	574.5	425.5
0.882	340.0	299.8	582.2	417.8
0.884	332.9	294.2	589.8	410.2
0.886	325.8	288.6	597.4	402.6
0.888	318.7	283.0	605.0	395.0
0.890	311.6	277.3	612.7	387.3
0.892	304.7	271.7	620.3	379.7
0.894	297.8	266.2	627.8	372.2
0.896	290.9	260.6	635.4	364.6
0.898	284.1	255.1	642.9	357.1
0.900	277.3	249.5	650.5	349.5
0.902	270.7	244.1	657.9	342.1
0.904	264.1	238.7	665.3	334.7
0.906	257.7	233.4	672.6	327.4
0.908	251.3	228.2	679.8	320.2
0.910	244.9	222.8	687.2	312.8
0.912	238.6	217.6	694.4	305.6
0.914	232.3	212.3	701.7	298.3
0.916	226.0	207.0	709.0	291.0

Spec. Grav. at 12° C. (= 53.6° F.)	1 Kilogr. contains Ammonia in grams.	1 Liter contains Ammonia in grams.	1 Liter is composed of:	
			Water in cc.	Liquefied Ammonia in cc.
0.918	219.7	201.6	716.4	283.6
0.920	213.4	196.3	723.7	276.3
0.922	207.3	191.1	730.9	269.1
0.924	201.2	185.9	738.1	261.9
0.926	195.1	180.6	745.4	254.6
0.028	189.0	175.4	752.6	247.4
0.930	182.9	170.1	759.9	240.1
0.932	176.9	164.8	767.2	232.8
0.934	170.9	159.6	774.4	225.6
0.936	164.9	154.3	781.7	218.3
0.938	158.9	149.0	789.0	211.0
0.940	152.9	143.7	796.3	203.7
0.942	147.1	138.5	803.5	196.5
0.944	141.3	133.3	810.7	189.3
0.946	135.6	128.2	817.8	182.2
0.948	129.9	123.1	824.9	175.1
0.950	124.2	118.0	832.0	168.0
0.952	118.7	113.0	839.0	161.0
0.954	113.2	108.0	846.0	154.0
0.956	107.8	103.0	853.0	147.0
0.958	102.4	98.1	859.9	140.1
0.960	97.0	93.1	866.9	133.1
0.962	91.6	88.1	873.9	126.1
0.964	86.2	83.0	881.0	119.0
0.966	80.8	78.0	888.0	112.0
0.968	75.5	73.0	895.0	105.0
0.970	70.2	68.0	902.0	98.0
0.972	65.2	63.3	908.7	91.3
0.974	60.2	58.6	915.4	84.6
0.976	55.2	53.8	922.2	77.8
0.978	50.2	49.1	928.9	71.1
0.980	45.3	44.3	935.7	64.3
0.982	40.4	39.6	942.4	57.6
0.984	35.5	34.9	949.1	50.9
0.986	30.6	30.1	955.9	44.1
0.988	25.8	25.5	962.5	37.5
0.990	21.0	20.7	969.3	30.7

The two last columns in this table are of special interest in the manufacture of ice by Carré's system, in which connection the author made some explanatory remarks and suggestions. Schweiz. Wochenschr. f. Ph., June 29th, 1877, p. 206. Arch. J. Ph. June, 1877.

Chloride of Ammonia—Compounds with the Chlorides of Potassium and of Sodium.—E. Cheuvreul had his attention drawn to some cubical crystals in guano, which, on analysis, proved to contain the chlorides of ammonium and of sodium. By a large number of experiments he has determined that chloride of ammonium will form crystalline compounds with the other alkaline chlorides. These crystals are of two forms. One, cubical, is formed when chloride of ammonium is mixed with one, two, or three equivalents of chloride of sodium, or with any proportion of chloride of potassium. The other, needle-shaped, is formed in solution of chloride of ammonium and sodium when the latter is in the proportion of two or three equivalents to one of the former. The composition of both forms of crystals is very various. Chem. & Drug., Nov. 1877, p. 438; from J. de Ph. et de Chim.

Nitrite of Ammonium.—Berthelot has studied the characters of this salt in a solid state. It is best obtained by double decomposition of concentrated solutions of nitrite of barium and sulphate of ammonium, operating cold, and evaporating in a vacuum over burned lime. Owing to spontaneous decomposition but 30 to 40 per cent. of the theoretical quantity of the salt is obtained. Under any circumstances it will require several weeks to complete the operation. The salt must be evaporated to complete dryness, and it must be kept in a capsule over lime. If kept in stoppered bottles, owing to spontaneous decomposition (into nitrogen and water), explosion is liable to occur sooner or later. This change occurs slowly during the ordinary winter temperature, but rapidly in summer. When heated to 60° or 70° C. (= 140° to 158° F.), it remains apparently unchanged for a few moments and then explodes with detonation. The latter effect is also produced by the stroke of a hammer. The concentrated aqueous solution is decomposed in the cold more rapidly than the dry salt. When such a solution is agitated it effervesces like champagne. If kept for several months, the salt is almost completely decomposed and water remains, containing and retaining a few per cent., permanently. The dry salt is white, crystalline, but elastic and tough, may be rolled between the fingers and adheres remarkably fast to the sides of the vessel in which it is prepared. Its composition is H_4N,NO_2 $(O = 16)$. Arch. Ph., Nov. 4th, 1877, p. 402.

CÆSIUM AND RUBIDIUM.

Cæsium and Rubidium—Properties of Certain Compounds.—Dr. Richard Godeffroy has prepared, studied the characters, and determined the composition of a number of double compounds of cæsium and rubidium.

Cæsium-palladious chloride is obtained by mixing solutions of cæsium chloride and palladious chloride, forming a yellow crystalline precipitate, which dissolves in a large quantity of water and crystallizes, upon the spontaneous evaporation of such solution, in tufts of needles of a handsome red-brown color. The formula of this compound is $PdCl_2 2CsCl$. Soluble in water; insoluble in alcohol; decomposed by boiling the aqueous solution in alcohol or glycerin.

Cæsium-manganous Chloride.—Three compounds are obtained, $MnCl_2,2CsCl$, by mixing solutions of manganous chloride and cæsium chloride in hydrochloric acid, whereby the compound is deposited in crystals; $2(MnCl_2,2CsCl),5H_2O$, by spontaneously evaporating the solution from which the above compound has precipitated, small monoclinic prisms of a red color being deposited; and $MnCl_2,2CsCl,3H_2O$, which is formed if the first salt is dissolved in water, and allowed to evaporate spontaneously. It forms pale rose-red crystals.

Rubidium-manganous chloride, $MnCl_2 2RbCl,3H_2O$, is obtained in the form of large, pale rose-red crystals, which are readily dissolved by water, but insoluble in alcohol, when aqueous solution of manganous chloride and rubidium chloride are mixed and allowed to evaporate spontaneously.

Rubidium-cadmium chloride exists in three forms. The compound $CdCl_2 + 2RbCl$ is obtained in white crystals when the solutions of cadmium and rubidium chloride in hydrochloric acid are mixed and evaporated. If cadmium chloride is in excess, a double salt of the composition $(CdCl_2,RbCl)_6 3H_2O$ crystallizes out, in the form of long, hard, silky-glistening needles. If the mother liquors from which this second compound has crystallized, are evaporated to dryness, redissolved in water, and evaporated spontaneously, large, well-formed prisms of a third double salt, having the composition $(CdCl_2,RbCl)_4,H_2O$, are deposited.

Rubidium-mercuric Chloride.—This was obtained in four modifications. When hydrochloric acid solutions of rubidium and mercuric chloride are mixed and evaporated, small needle-shaped crystals, $HgCl_2.2RbCl$, crystallize out. If this salt is dissolved in water and the solution evaporated spontaneously, the compound, $HgCl_2,2RbCl,2H_2O$, crystallizes out in large colorless prisms. When a mixture of aqueous solutions of equal weights of mercuric and rubidium chloride are evaporated, a third double salt, $(HgCl_2)_2RbCl$, crystallizes out, forming a dense magma of silky-glistening needles. Finally, a fourth modification is obtained by heating the third compound to 150° C. (=302° F.). The double salt loses one molecule of $HgCl_2$, and the new compound has the formula $HgCl_2,RbCl$.

Rubidium auric chloride is obtained in the form of a golden-yellow precipitate when dilute hydrochloric acid solution of auric and rubidium chloride are mixed. The compound is soluble in water, and yields, on spontaneous evaporation of such solution, nitre-like, long, prismatic, golden-yellow crystals, which have the composition, $AuCl_3,RbCl$.

Cæsium-auric chloride is obtained in the same manner as the corresponding rubidium compound. It crystallizes in small, reddish-yellow, needle-shaped crystals, which are with more difficulty soluble in water, alcohol, and ether than the rubidium salt, and have the composition, $AuCl_3,CsCl$. Arch. Ph., Jan. 1878, p. 47–54.

BARIUM.

Carbonate of Barium.—Jeambert finds that carbonate of barium is almost undecomposable by heat alone, though Abich has shown that it can be converted into caustic baryta at the temperature of a forge. If the carbonate is mixed with charcoal the decomposition is easier, a full red heat being sufficient to produce baryta and carbonic oxide. The charcoal maintains around the carbonate an atmosphere in which the tension of the carbonic acid is constantly nil, and the decomposition, which only gives rise to a very slight tension of gas, can thus continue indefinitely. The author has verified this hypothesis by heating carbonate of barium in a current of inert gas, and found decomposition ensue at a red heat. Ch. News, March 8th, 1878, p. 103; from Comp. Rend., Feb. 4th, 1878.

Iodide of Barium.—J. Thomsen finds that when baric iodide is crystallized under normal circumstances, it contains $7H_2O$ (O =

16), and regards the formation of a salt with $2H_2O$—as given by Werther—as problematical. Ch. News, Aug. 3d, 1877, p. 53.

CALCIUM.

Lime—Solubility in Water.—A. Lamy observes that the solubility of pure lime in water may vary in a permanent or transitory manner with its nature or origin, its state of molecular aggregation, the temperature at which it has been prepared, its dehydration or recalcination, the duration of its contact with water, and lastly, the previons heating of the lime-water, more or less prolonged. The least soluble lime is that prepared from a carbonate precipitated from the pure nitrate with carbonate of ammonium. The most soluble resulted from the calcination of limes of different kinds, the crystalline hydrate, marble, and the nitrate. Crystallized hydrate of lime dissolves only with excessive slowness at temperatures near that of melting ice. The numbers found at 0°, 54°, and 100° C. (= 32°, 129°, and 212° F.), differ very sensibly from those given by Dalton and Phillips. Ch. News, March 8th, 1878, p. 103; from Compt. Rend., Feb. 4th, 1878.

Chloride of Calcium.—A. Dette observes that if anhydrous chloride of calcium is dissolved in the smallest possible quantity of water, the temperature rises as the salt dissolves. If the solution, after it has cooled down to its original temperature, is diluted with successive quantities of water, the temperature rises at each addition, and these increases go on diminishing by degrees, becoming *nil* when a very considerable quantity has been added. Ch. News, Jan. 4th, 1878, p. 10; Compt. Rend., Dec. 10th, 1877.

Sulphate of Calcium.—For a long time the only double salts of sulphate of calcium known were those having the formulæ $CaNa_2(SO_4)_2$ and $CaNa_4(SO_4)_3+H_2O(O=16)$, and it was only lately that the existence of another body, containing potassium instead of sodium $(CaK_2(SO_4)_2+H_2O)$, was proved; although it has been formed in tons during the last fifty years in certain manufacturing operations, but has always been mistaken for sulphate of calcium. J. B. Hanney has now made same experiments on the double compounds which sulphate of calcium is capable of forming. He finds that the double sulphate of calcium and potassium, when treated with large quantities of water, gives up the potassium salt and becomes normal sulphate of calcium. If this sulphate of calcium is again treated with sulphate of potassium it again forms the double compound. The author has also obtained another compound of this double salt with water, which has the composition $2CaK_2(SO_4)_2+3H_2O$ (O=16). This compound is formed when a strong solution of impure sulphate of potassium containing sulphate of calcium is evaporated by boiling till a large quantity of granular sulphate of potassium is collected. By washing away all the soluble salts with water, a white salt, similar to steatite, is left. The principal difference between this salt and that before described is that water does not decompose it, except after long boiling. Double compounds of chromate of potassium and sulphate of potassium also appear to exist. The analysis of some crystalline deposits upon tubes (used in large manufacturing operations) gave figures, which in one case corresponded with the formula $CaSO_4+K_2CrO_4+H_2O$, and in another, $CaSO_4$, $2K_2CrO_4$. These two salts were so similar to each other that they could not be distinguished as separate salts by the eye. They had a bright golden appearance, such as is possessed by iodide of lead crystallized from boiling water. They were flat prisms, but too confused and irregular to enable the determination of their crystalline form. On treatment with water the chromate of potassium was completely removed, the shape of the crystals remaining intact but becoming white and quite soft. The author also made some experiments—which are as yet incomplete—on the behavior of sulphate of calcium to hydrochloric acid. He finds that when a solution of the salt is boiled to dryness, the last portions of the acid are not easily expelled, but that two or three per cent. are after retained at 120° to 130° C. (= 248° to 266° F.), and that if the evaporation is conducted by active ebullition, and especially under pressure, an increasing quantity of hydrochloric acid is retained. On simply dissolving $CaSO_4$ in hydrochloric acid, pure crystals of $CaSO_4+2H_2O$ crystallize out. J. Chem. Soc., Oct. 1877, p. 399.

Phosphate of Calcium.—E. Hirschsohn has completed a series of experiments, which were undertaken with a view to determine the most suitable method for obtaining phosphate of calcium for medicinal purposes. Such a preparation should respond to the following requirements: 1, constant composition; 2, crystallinity; 3, ready solubility in dilute acids, especially in dilute hydrochloric acid, and 4, a good yield. The results of the author's experiments confirm the view that a good phosphate of calcium for therapeutic purposes can only be obtained by precipitation of the phosphate of sodium with an excess of chloride of calcium. They show, that it is not possible to obtain much more than one-half of the calcium taken in operation as phosphate, but that, when phosphate of sodium is used in sufficient quantity to produce neutral reaction, when the latter is not added too slowly to the solution of chloride of calcium, when the operation is conducted at the ordinary temperature, the mixture transferred immediately to a filter, washed, and dried at a temperature of 30° to 40° C. (= 86° to 104° F.), the phosphate of sodium is not only completely utilized, but the preparation corresponds to all the above-named conditions. In the author's experience the proper proportions are 100 parts of anhydrous chloride of calcium and 187 parts of crystallized phosphate of sodium ($=Na_2HPO_4+12H_2O$) ($O=16$); the former being dissolved in 3–4 parts of water by weight, the latter in about 30 parts before their admixture. Ph. Zeitschr. f. Russ., July 1st, 1877, p. 385.

Phosphate of Calcium—Preparation from Calcined Bones.—While the Pharmacopœias of Germany, Austria, and Switzerland direct the preparation of medicinal phosphate calcium from chloride of calcium and phosphate of sodium, the British, French, and Netherlands (and also the U. S.) Pharmacopœias still direct its preparation from calcined bones. With a view to determining the distinction, if any, between the products of the two processes, W. Stoeder has made experimeats, and finds that either method will yield exactly the same compound—*hydrophosphate of calcium* $CaHPO_4+2H_2O$ ($O=16$), which, by the influence of strong bases, is converted into normal tribasic phosphate Ca_32PO_4 ($O=16$). Notwithstanding slight deviation in the direction of the three last-named Pharmacopœias, such as directing the addition of ammonia to the solution of bone phosphate in hydrochloric acid to saturation, or to slight alkalinity; the washing of the precipitated phosphate with cold, with warm, or with boiling water—the products are identical; being crystalline (plainly observable under a microscope of 250 diameters), and soluble in water to the amount of 95-100,000th, whereas the product obtained by adding a large excess of ammonia—twice the quantity necessary to render the acid liquor just alkaline—is the tribasic phosphate, which is amorphous, and soluble only to the extent of 22-100,000th. The author recommends the dilution of the acid solution of phosphate of calcium with double the quantity of water directed by Pharm. Neerlandica, and that the precipitate be washed several times with large quantities of water by decantation before transferring and washing it through a strainer until chlorine is no longer indicated. But, whilst the product of the various processes is identical as obtained from the same lot of calcined bones, it nevertheless may vary in the readiness with which it is affected by hydrochloric acid when obtained from different lots. This is perhaps owing to the variation in the temperature at which the bones are calcined. The author, therefore, favors the preparation of the compound by the formula of the Ph. Germ., the general adoption of which he regards only as a question of time. Arch. Ph., Nov. 1878, p. 416.

Phosphate of Lime Glass.—According to Sidot the acid phosphate of lime is transformed by heat into an entirely crystalline body. This substance, which the author calls pyrophosphate of lime, if exposed afresh to a higher temperature, becomes perfectly vitreous, giving up a part of its elements, and descending probably to the state of tribasic phosphate of lime ($3CaO,PO_5$). The glass thus obtained is perfectly transparent; its index of refraction is 1.523, that of crown glass being 1.525. Its sp. gr. is 2.6. It is not attacked by acid in the cold, but it is acted on by boiling acids and potassa. It is not affected by hydrofluoric acid. Ch. News, July 27th, 1877, p. 43; from Compt. Rend., June 25th. 1877.

MAGNESIUM.

Carbonate of Magnesium—Detection of Lime.—A small percentage of lime is always present in carbonate of magnesium, but according to F. W. Marquardt, the quantity of lime is sometimes quite large. This is generally the case with the magnesia of English manufacture, and its presence is best evidenced by the taste, which is quite caustic in the presence of considerable quantities of lime. He recommends this as a means of determining the quality of the carbonate. Ph. Centralh., No. 15, 1878, p. 137.

Impure Magnesia.—An article of heavy magnesia was examined by H. C. Archibald, and proved to be quite impure. It contained 4.14 per cent. of carbonic acid, and 1.1 per cent. of sulphuric acid, probably present as sodium salt. The author is informed that this heavy magnesia, which is quite gritty, is of foreign manufacture, and it was sold in good faith as being absolutely pure, of proper density (which it was not), etc. A. J. Ph., April, 1878, p. 161.

BERYLLIUM.

Glucinium.—L. P. Wilson and O. Petterson have studied the physical properties, etc., of this metal. Glucinium in its salts presents certain analogies both with the magnesium and with the aluminium group, but no decisive clue is afforded to the true atomicity of the metal, which can only be deduced from its specific heat. The preparation of the metal is difficult; the authors could not succeed in obtaining it from its chloride by the electric method, and they adopted, therefore, the process of Wohler and Debray, decomposing the chloride with potassium or sodium in a wrought-iron crucible closed with a screw. Glucinium thus obtained is a steel or tin-gray metal, of the sp gr. 1.901 at 0° C. (= 32° F.). It is hard and crystallizes readily. If melted it breaks under the hammer, and does not fuse at a temperature where salt is readily volatilized. It is unalterable in the air, and even at a red heat in a current of oxygen. Vapor of sulphur does not affect it. Before the oxidizing flame it becomes covered with a layer of oxide, but does not take fire. It has no action upon water either warm or cold. It decomposes hydrochloric and hydrosulphuric acid and the alkaline hydrates, hydrogen being evolved very briskly if heat is applied. Nitric acid attacks it more slowly. The sp. gr. of the impure metal being 1.9101, that of pure glucinium from its known composition was calculated at 1.64. The specific heat of glucina between 0° and 100° C. (= 32° and 212° F.) is 0.2471. Hence it must be considered analogous to aluminium, its atomic weight being 13.8, and its oxide having the formula Be_2O_3. Ch. News, May 10th, 1878, p. 195; from Compt. Rend., April 1st, 1878.

ALUMINIUM.

Aluminium.—Cassamajor had observed that when aluminium is introduced into a vessel containing metallic mercury, acidulated water, and a rod of zinc, with a view to amalgamating it, the aluminium amalgam has the peculiarity of becoming quite hot when removed from the vessel and dried, and finally becomes covered with a chalk-like coating. When this coating is removed, no traces of amalgam remain. Karl Jehn now finds this chalk-like coating to be alumina, and in the main corroborates the observations of Cassamajor; but he failed to observe that the amalgamated plate becomes even warm under these circumstances, not to speak of the decided heat and apparent boiling of mercury mentioned by Cassamajor. Arch. Ph., Feb. 1878, p. 126.

Aluminium—Resistance to the Common Agents of Wear.—Cl. Winkler has made experiments with spoons of aluminium, of white metal, and of silver, subjecting them to such influences as are common during the daily use of such utensils, whereby he proves that aluminium is not as readily affected by such influences as has hitherto been generally assumed, and that, if it could be produced cheaply, it would advantageously replace other metals for the construction of various utensils. While the spoon made of silver, by the treatment to which it was subjected, lost at the rate of 0.403 per cent. per annum, and that of white metal lost at the rate of 1.006 per cent., that of aluminium lost 0.630 per cent. It assumed at the same time a bluish-gray color and lost its brilliancy, whilst that of white metal also lost its brilliancy, but assumed an unpleasant grayish-yellow color. The silver lost only in polish, while its white color remained comparatively unimpaired. Ph. Centralh., Nov. 15th, 1877, p. 387.

Aluminium Plate as a Support in Blow-pipe Work.—See Blow-pipe Work, under Apparatus and Manipulation.

Terra Sigillata, T. Lemnia, and T. Miraculosa Saxoniæ, are argillaceous earths which were well known to the older pharmacists. According to Prof. X. Landerer, the Lemnian earth is still largely used in the Orient as an absorbent, and comes in the form of troches, sometimes gilded and bearing the impression of a Turkish seal. They are much used together with a decoction of mastic as an infallible remedy in cholera infantum. Externally is applied a poultice of bread, boiled in strong red wine, and mixed with powdered aromatic herbs. These poultices are called *Krasospoma,* from *krasi*, wine, and *psoma,* bread. A. J. Pharm., April, 1878, p. 175.

Pure Aluminium Salts—Industrial Production.—The presence of sulphate of iron in ordinary sulphate of aluminium, introduced when the latter is produced from ordinary clay, is objectionable in its application for dyeing, and may be entirely obviated, according to Dulca, by pursuing the following method of purification:

The solution of the ordinary sulphate of aluminium is precipitated by a mixture of milk of lime and carbonate of lime. The decomposition is rapid, occurs at ordinary temperature, and extends both to the aluminium and iron salt; sulphate of calcium, and the hydrates of alumina and of oxide of iron being formed. A solution of caustic soda is now added, which dissolves the alumina and leaves the other compounds undissolved. The clear liquor, obtained by decantation, is now treated with carbonic acid, whereby the pure alumina is precipitated, carbonate of sodium being formed. The washed alumina may be converted into sulphate, acetate, or other saline compound. The solution of carbonate of sodium, after treatment with slaked lime, serves to dissolve a fresh portion of alumina. Ph. Centralh., Sept. 13th, 1877, p. 299.

Crystallized Potassa-Alum—Decomposition at 100° *C*. (= 212° *F*.).—Alex. Naumann finds that crystallized potassa-alum gradually undergoes dissociation when heated to 100°C. (= 212° F.) in sealed tubes. The fused substance first gives off water of crystallization, and deposits a solid compound (probably anhydrous alum), after which there is formed in the liquid a basic compound of alumina, potassa, sulphuric acid, and water, corresponding with that formed in alum solutions heated to 100°C. (= 212° F.), as formerly described by the author. In one experiment 15 grams of freshly crystallized air-dried alum was sealed up in a glass tube and placed in boiling water, when the alum melted to a perfectly clear liquid. In three hours a distinct turbidity appeared, and in five hours the liquid became quite opaque from separation of an apparently amorphous solid, which at the end of four days had settled down, leaving the supernatant liquid clear. At the same time crystalline laminæ had formed on the sides of the tube. The deposited solid (weighing 8.5 grams), when treated with cold water, left 6 per cent. of insoluble residue (basic compound). The soluble portion was found to contain sulphuric acid, alumina, and potassa in the same proportion as crystallized alum, as was also the case with the liquid contents of the tube. J. Chem. Soc., Aug. 1877, p. 166; from Ber. d. Deut. Ch. Ges.

MANGANESIUM.

Manganese—Volumetric Determinations in Ores.—A. G. Parreno recommends the following method: The powdered ore is roasted and is then treated with hydrochloric acid, whereby chlorine is eliminated in accordance with the following equation:

$$Mn_3O_4 + 8HCl = 3MnCl_2 + 4H_2O + Cl_2 \ (O = 16).$$

The chlorine is passed into an excess of solution of iodide of potassium and the iodine liberated is then titrated with hyposulphite of iodium. Ph. Cent. H., Nov. 22d, 1877, p. 396; from Ann. d. Chem. u. Phys.

Manganese—Detection in Ashes.—The manganese usually occurs in the ash, in the state of oxide, or a salt, such as a silicate. G. Campani finds that in order to detect it, if the ash contains sufficient phosphates, it is merely necessary to treat the ash with warm hydrochloric acid, to filter and to evaporate to dryness on a sand-bath, when the residue, if any manganese be present, will acquire a more or less pronounced amethyst color. Those ashes which do not contain phosphates, after being exhausted with hot water, are boiled with a mixture of phosphoric and nitric acids in the proportion of 85 parts, by measure, of the latter to 15 parts of syrupy phosphoric acid. The clear liquid is then evaporated as before. By this means the manganese in the ashes of wood, corn, tobacco, etc., can be easily detected. The process is applicable to manganiferous minerals. J. Chem. Soc., Aug. 1877, p. 223; from Gazz. Chem. Ital.

Manganese Separation as Anhydrous Sulphide.—The precipitation of manganese as anhydrous (green) sulphide presents many advantages, as the precipitates, unlike the flesh-colored hydrated sulphide, quickly settles down and is easy to filter and wash. Fresenius finds that the conversion of the flesh-colored into the green sulphide is especially quick when the solution is at once mixed with an excess of sulphide of ammonium. The presence of chloride of ammonium, however, which it is necessary to add, hinders or even prevents altogether the conversion into the green sulphide, and consequently this method cannot be employed. A. Classen finds, however, that the separation of manganese as green sulphide may be effected with certainty by first heating the solution with oxalate of calcium and then adding ammonia and sulphide of ammonium. The green sulphide, or a mixture of the two, is at once formed and the complete conversion takes place after warming on a sand-bath. Oxalic acid and oxalate of ammonium behave similarly to oxalate of calcium, but the latter is to be preferred. The presence of chloride of ammonium does not influence the formation of the green precipitate. J. Chem. Soc., Oct. 1877, p. 514; from Zeitschr. Anal. Chem. xvi.

Sulphide of Manganese.—The change of color from the flesh tint to sulphur yellow in sulphide of manganese has already been the subject of much investigation. De Clermont and Guiot have now made experiments which have led them not only to discover several new cases of occurrence of this change, but several also where it has been stated not to take place, in which, nevertheless, they have observed it. They have also determined that when oxalate of ammonium is added to sulphide of manganese yellow liquid is obtained, from which an excess of sulphide of ammonium precipitates rose-colored sulphide of manganese. But on boiling this for some time the sulphide turns green, whilst, if ammonia is previously added to the yellow liquid, the rose-colored precipitate passes rapidly to green. The authors have attempted, but failed to reconvert the green sulphide, which is crystalline, while the rose-colored is amorphous, into the rose-colored modifications. They came to the conclusion that the two bodies are the same sulphide in different degrees of hydration. J. Chem. Soc., Oct. 1877, p. 408; from Bull. Soc. Chem.

Pure Chloride of Manganese—Preparations from Chlorine Residues.—A. Pizzi recommends that the clear liquid be boiled with granulated zinc until the ferric chloride is reduced and the iron precipitated in the metallic state, together with any nickel that may be present. The liquid is filtered, acetate of sodium and some acetic acid added, and the zinc, lead, and copper precipitated by sulphuretted hydrogen. On adding sulphide of ammonium to the filtrate the manganese and cobalt are thrown down as sulphides. This precipitate, after being thoroughly washed, is treated with hydrochloric acid, which dissolves the manganese and leaves the cobalt. The solution of pure chloride of manganese thus obtained yields pure carbonate of manganese, from which the other salts of manganese may be prepared. J. Chem. Soc., Aug. 1877, p. 169; from Gazz. Chim. Italiana.

Manganese Blue.—Gaston Bong obtains this blue by igniting silica and any compound of manganese with baryta or a mixture of soda and lime in an oxidizing atmosphere. The proportion of manganese affects the intensity of the blue, but not the tone. By increasing the proportion of alkali or silica, a green or violet tone is produced. The use of potassa does not give a good result. The ignition should be effected at a red heat in the absence of reducing gases. These facts lead to a very delicate process for detecting the presence of manganese; especially in earthy substances, a trace of that element producing a blue color on ignition with a mixture composed as above indicated. Ch. News, March 29th, 1878, p. 133; from Bull. de la Soc. Chim. de Paris.

FERRUM.

Iron.—Henry Debrunner draws attention to the quality of iron suitable for pharmaceutical preparations. The Pharmacopœia recommends iron wire for these purposes; musical wire, being steel, and therefore purer, is also often applied and will yield a sufficiently pure preparation. It is, therefore, to be preferred to the ordinary wire. The material, however, which the author recommends is soft steel drillings, they being cheaper, purer, and not so difficult to dissolve as wire. Any brand of steel that will make good axle or boiler plate will also yield pure preparations on dissolving, and the turnings and drillings of such can easily be obtained at any steel works or machine shop. The following analyses show the difference in the composition of various forms of iron referred to:

	Iron wire.	Musical (steel) wire.	Axle.	Boiler plate.
Carbon,	0.2730	0.5320	0.2700	0.3010
Silicon,	0.1418	0.0700	0.0800	0.0492
Phosphorus,	0.0809	0 0427	0.0382	0 0298
Sulphur,	0.0610	0.0182	0.0157	0.0163
Manganese,	0.7027	0.0600	0.0747	0 0643
Copper,	trace.			
Iron,	89.7406	99.2771	99.5214	99.5394
	100.0000	100.0000	100.0000	100.0000

The author reviews the nature of the chemical changes to which the various impurities are subject during the action of various acids on the iron, and in what respect their presence in unusual quantity may affect the resulting preparation. A. J. Ph., Nov. 1877, p. 529.

Ferrum Redactum–Quantitative Determination of Metallic Iron.—C. Schacht reviews the tests of purity which are given in the various Pharmacopœias as well as the processes proposed by various investigators for its assay. The most usual method is to treat reduced iron with a solution of iodine of known strength, allowing it to macerate until all the iron had combined with iodine, and then determining the excess of iodine by means of standard hyposulphite solution. The author's experiments determine that this method, whether conducted at the ordinary temperature or at a temperature of 40°–50° C. (= 104°–122° F.), is unreliable, as is also the method in which *bromine* water alone is employed; but if a solution of bromine (5 grams) and bromide of potassium (7.5 grams) in 100 cc. of water is substituted, and the maceration is allowed to take place at ordinary temperature, the result is quite accurate. Perfectly pure reduced iron is also found by him to be entirely soluble in solution of ferric chloride, sp. gr. 1.300. The author concludes by giving the following characteristics of pure reduced iron: "An exceedingly fine, gray, loose, lustrous powder, which becomes converted into ferric oxide by heating in the air. It should be completely soluble in warm, diluted, pure hydrochloric acid, and the hydrogen evolved must be entirely indifferent against acetate of lead paper. When treated for half an hour with 25 parts of solution of ferric chloride of sp. gr. 1.300, in a glass-stoppered vial, under repeated shaking, it is entirely dissolved." New Rem., July, 1877, p. 207; from Pharm. Zeit., 1877.

New Iron Compound—(Mixture?).—R. Böttger proposes a solution *for depositing iron on copper plates for engravers* as follows: 10 grams of prussiate of potash and 20 grams of seignette salt are dissolved in 200 cc. of water. A solution of 3 grams of ferric sulphate in 50 cc. of water is then added, whereby a precipitate of Prussian blue is produced. A solution of caustic soda is then added, drop by drop, until this precipitate is redissolved, and a clear yellow solution is formed, which may be used for depositing iron upon copper. The same liquid may serve for dyeing cloth blue, by steeping the cloth in it, drying in the air, passing into dilute sulphuric acid at 2 per cent., washing, and drying. Chem. News, Jan. 6th, 1877, p. 11: from Chem. Central. H.

Oxides of Iron.—H. Moisson has determined that if ferric oxide, obtained by calcining oxalate of iron, is heated to 330° C. (= 626° F.) in a current of pure hydrogen for 30 minutes, the result is a black magnetic powder, not pyrophoric, and having the composition of *magnetic oxide.* It is not a mixture of ferric oxide and metallic iron. If ferric oxide is kept for 20 minutes in a current of pure dry hydrogen at 500° C. (= 932° F.), a black powder is obtained, which is duller than the former, magnetic, pyrophoric, and has the composition of *ferrous acid.* At 500° C. (= 932° F.) it decomposes carbonic acid, and becomes transformed into magnetic oxide. If ferric oxide is reduced at 700° C. (= 1472° F.), *metallic iron* is obtained, which is not pyrophoric. At 1000° C (= 1832° F.) the pyrophoric *ferrous oxide* obtained at 440° C. (= 824° F.) loses its properties. Ch. News, Jan. 6th, 1877, p. 10; from Compt. Rend., June 4th, 1877.

Oxide of Iron—Determination, together with Alumina, in Presence of Phosphoric Acid.—H. Pellot adds to the liquid containing phosphoric acid, alumina, and oxide of iron, an excess of chloride of calcium, and then ammonia; this precipitates tricalcic phosphate, alumina, and ferric oxide. The precipitate is ignited and weighed. It is then dissolved in hydrochloric acid; in one portion the phosphoric acid is determined by means of uranium, and in another portion the iron by stannous chloride. The phosphoric acid is calculated into tricalcic phosphate, and the iron into Fe_2O_3, and the difference between their combined weights and that of the original precipitate gives the alumina. If sulphuric acid is present, it must be separated by baryta before the addition of ammonia; the presence of baryta does not affect the results, provided sufficient chloride of calcium is added to precipitate all the phosphoric acid. J. Chem. Soc., Aug. 1877, p. 223; from Bull. Soc. Chim.

Oxide of Iron—Determination by Stannous Chloride.—H. Uelsmann remarks that two objections have been made to the method of estimating iron by means of standard solutions of stannous chloride, recommended by Fresenius and others. First, that the solution of stannous chloride rapidly decomposes, and has constantly to be restandardized; secondly, that the results are not constant, the same weight of one requiring varying amounts of standard solutions. The first objection is met by employing for the conservation of the standard solution a bottle to which the air can have access only through a wash bottle containing pyrogallate of potassium. When the solution is kept in this manner, the variation in four weeks is under 0.1 cc. The second objection is invalid, as, when the solution is strongly acid and hot, the limits of error can be confined to 0.05 cc. The extreme sharpness, and above all the rapidity of the operation, render it preferable to any other, especially in mining districts. From the time of weighing the solution, boiling and titration do not occupy more than five minutes. J. Chem. Soc., Aug. 1877, p. 223; from Zeitschr. Anal. Chem., xvi.

Anhydrous Ferric Oxide—Solution in Acids.—Calcined anhydrous ferric oxide is, as is well known, with great difficulty dissolved in even the stronger acids. Prof. A. Classen has now found, that if the ferric compound is triturated to a fine powder and digested in diluted caustic potassa, the heavy powder is changed to a flocculent substance, and when well washed with water, very readily dissolves in hydrochloric acid. Ph. Centralh., June 13th, 1878, p. 310.

Ferrum Oxydat. Sacchar. Solut.—In the preparation of this compound on a large scale, the precipitation with boiling water, settling and washing of the precipitate require a long time. Oscar Ficinus finds that the process may be much shortened by pouring the mixture of caustic soda lye, ferric chloride and syrup in thrice its volume of 90 per cent. alcohol, washing the resinous precipitate produced several times with alcohol by decantation, and then evaporating it to dryness with the necessary quantity of sugar as in the ordinary process. The alcohol may be again recovered with a slight loss, such loss being fully compensated by the rapidity of the process. Arch. Ph., Jan. 1878, p. 29.

Ferric Phosphate—Composition.—It appears to be generally believed that the precipitate formed by the reaction between ferric chloride and ordinary phosphate of sodium varies in composition according as either salt is in excess. To ascertain if this be true, G. W. Waine prepared two samples of ferric phosphate: the one by adding the ferric chloride to solution of phosphate of sodium in excess with constant stirring; the other by adding the phosphate of sodium to ferric chloride. On examining the ferric phosphates by appropriate experiments, he found them to be essentially the same, but that there is a tendency to contain a slight excess of iron, especially when precipitated in excess of ferric chloride. When the precipitated ferric phosphate was exposed to air dried by sulphuric acid until its weight was constant, it was found to contain 2.65 molecules of water for each atom of iron present, and this water was not entirely expelled at 250° C. (= 482° F.). The precipitate appears, therefore, to be represented by the formula $2FePO_4,5H_2O$ ($O = 16$). Ch. News., Sept. 21st, 1877, p. 132.

Pyrophosphate of Iron.—According to Langeli, a spurious kind of pyrophosphate of iron has made its appearance in the (Italian ? Rep.) market, which appears to be prepared as follows:

Into a warm solution of 390 grams of pyrophosphate of sodium in 420 grams of distilled water, are poured 41 grams of a solution of ferric chloride, sp. gr. 1.525, diluted with 180 grams of water, and the mixture stirred. The precipitated ferric pyrophosphate separates at first, but then redissolves and imparts a red color to the liquid. Having filtered it, a little absolute alcohol is added, which causes the precipitation of pyrophosphate of iron and sodium in white crystals, which are collected, washed with absolute alcohol, and dried on blotting-paper.* New Rem., April, 1878, p. 117; from L'Orosi, Jan. 1878.

NICKEL.

Nickel Ores—New Sources of Nickel.—The localities where nickel ores are found, are comparatively few, and the extensive application to which nickel is applied, makes the discovery of new sources a matter of great importance. Recently valuable deposits of nickel ores have been discovered in New Caledonia, a French colony in the Pacific Ocean, east of Australia. These ores are hydrosilicates of magnesium and nickel, are free from sulphur and arsenic, and contain from 10 to 20 per cent. of nickel. According to the quantity of the latter, their color varies, being bluish white, yellowish green, or emerald green. A mixture of the various ores that have reached Europe, gave an analysis of the following composition: Oxide of nickel 18, oxide of magnesium 15, oxide of iron 7, silicic acid 38, water 22, = 100. Zeitschr. Œst. Ap. Ver., July 20th, 1877, p. 342.

Nickel—Process of Carburation.—Boussingault observes that nickel, like iron, is magnetic, sufficiently ductile to be forged and drawn into slender wire. Its point of fusion is very high, and if melted in a *brasqué* crucible it yields a homogeneous regulus of a silvery whiteness, containing carbon. The author has examined whether nickel, like iron, when carburetted, is capable of being tempered and acquires elasticity, and whether it renders steel less susceptible to oxidation. The results were decidedly negative, except that alloys of iron or steel, with large proportions of nickel, 30 per cent. and upwards, resist the oxidizing action of air and water. Chem. News, March 22d, 1878, p. 122; from Compt. Rend., Feb. 25th, 1878.

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* If the author's statement is in accordance with facts, the term "spurious" is scarcely applicable to this preparation, which would, on the contrary, be a new, and, perhaps, important compound.—Rep.

Nickel—Separation from Cobalt.—T. L. Phipson finds that xanthogenate of nickel, formed by precipitation with xanthogenate of potassium, is nearly insoluble in water, but that caustic ammonia readily dissolves the chocolate-brown precipitate. Xanthogenate of cobalt, which, when recently precipitated, is dark green, being insoluble in ammonia, the author applies this difference in their behavior to the separation of nickel from cobalt; the faintly acid chlorides of the two metals being precipitated with xanthogenate of potassium, washed by decantation, and agitated with ammonia water. Ph. Centr. H., Sept. 20th, 1877, p. 307.

Nickel—Separation from Cobalt.—Antony Guyard recommends a method for the separation of nickel from cobalt which is dependent on the ready solubility of recently precipitated sulphide of nickel in cold solutions of alkaline cyanides, while the corresponding cobalt compound is not affected. The solution of the recent nickel precipitate in *a cold and very dilute solution* of cyanide of potassium, takes place very rapidly; the sulphide of cobalt, being perfectly insoluble in this liquid, is collected in a filter, and the filtrate is precipitated with an acid (HCl or SO_4); the precipitate is cyanide of nickel, which yields the oxide on heating to redness. Zeitschr. Œst. Ap. Ver., Dec. 10th, 1877, p. 570.

CHROMIUM.

Chrome-iron Ore—Analysis.—A. Christomanos recommends the following method: 6.0 to 10.0 parts of dry caustic soda, 10.0 to 15.0 parts magnesia, 0.3 to 0.5 parts of the chrome ore, are intimately mixed and heated for one hour with an ordinary Bunsen's burner in a platinum crucible. The cooled yellow mass obtained is boiled in water, and a filtrate is obtained, which contains all the alumina and chromic acid with insignificant quantities of lime and magnesia, and in which the chromium, etc., may be determined volumetrically. But if it is desirable to precipitate the chromium as oxide, the filtrate is faintly acidulated with hydrochloric acid, an excess of caustic ammonia, carbonate of ammonium, and oxalate of ammonium is added, the mixture is boiled—with the occasional addition of water—until ammonia is no longer perceptible, and again filtered. By boiling the filtrate with excess of hydrochloric acid and alcohol, the chromic acid is converted into chloride of chromium, and the oxide may then be precipitated by adding caustic ammonia. Ph. Centr. H., Dec. 6th, 1878, p. 415.

Chromic Acid—New Method of Preparation.—Storck and De Coninck have found that when the green solution of chlorate of chromium—obtained by double decomposition between chlorate of barium and chrome alum—is evaporated by heat, the liquid becomes orange red, and chromic acid is formed, and may be obtained by evaporation. The reaction is explained by the following formula:

$$Cr_2O_3 + 3ClO_5 = 2CrO_3 + 3ClO_4.$$

Zeitschr. Œst. Ap. Ver., Oct. 20th, 1877, p. 485.

Salts of Sesquioxide of Chromium.—A. Etard has prepared a salt of chromium, containing 18 molecules of water, by acting on a solution of 100 parts of chromic acid in 150 parts of sulphuric anhydride and 225 parts of water, with the vapor of ether, collecting the crystals which form, drying them on porous plates, and washing them with ether. The sulphate so obtained is a *violet* salt of definite composition, crystallizing in plates, and remaining unchanged in air. When heated to 100° C. (212° F.) it loses 30.5 per cent. of its weight, and is converted into a *green* crystallized sulphate containing only six mol. of water of crystallization. By comparing the composition of these salts the author arrives at the opinion that the violet color is due to superhydration of the salt, and the violet sulphate would be expressed by the formula $Cr_2(SO_4)_3.CH_2O, + 12$ Aq. (O = 16). The violet phosphate containing $12H_2O$ is transformed into a green phosphate with $5H_2O$ at 100° C. (= 212° F.). Both the violet sulphate and violet phosphate are transformed into the green modification by strong dehydrating liquids, such as HNO_3, H_2SO_4, and PCl_3. J. Chem. Soc., Oct. 1877, p. 407; from Compt. Rend., vol. 84.

Chrome Blue.—According to Gaston Bong, a chrome blue is produced if the following materials are intimately mixed and strongly calcined with free access of air: Boric acid, 15 p.; alumina, 15 p.; carbonate of magnesium, 20 p.; chromate of barium, 2 p. Ch. News, March 29th, 1878, p. 133; from Bull. de la Soc. Chim. de Paris.

ZINCUM.

Zinc—Presence in Animals and Plants.—Bellammy and Lechartier have determined the occurrence of zinc in the human liver, in beef, in calf's liver, in eggs, in various vegetable substances, such as grains of rye, maize and barley, in vetches and beans, in the sugar beet, the stalks of maize, and in clover. The quantity present in the various substances is quite small, but it justifies the conclusion that the detection of small quantities of zinc in forensic determinations does not necessarily point to a case of poisoning by its administration. Zeitschr. Œst. Ap. Ver., Sept. 1st, 1877, p. 406.

Zinc Ores—Assay.—A. Mascazzini and J. G. Parodi have succeeded in causing electro-deposited zinc to adhere to platinum, under conditions similar to those for the electrolytic assay of copper, cobalt, and nickel. This renders the method applicable to the assay of zinc ores, and the experiments made with various ores leave no doubt as to the superiority of the process. J. Chem. Soc., Aug. 1877, p. 221; from Gazz. Chim. Ital.

Oxide of Zinc—Presence of Sulphite as Impurity.—W. W. Stoddart draws attention to a sample of oxide of zinc occurring in English commerce and imported from the continent, which contained 9.13 per cent. of sulphite of zinc. He is unable to account for the presence of this compound, which renders it unfit not only for pharmaceutic, but also for painters' uses, unless it be that the article was manufactured from sulphide of zinc in some rapid and imperfect manner, which had partially oxidized some of the sulphide and produced the product under consideration. Very slight traces only of sulphate were found. Yearbook of Ph. 1877, p. 526.

Phosphide of Zinc—Formula of Pharm. Society of Paris.—A tubulated stoneware retort is charged to one-fourth of its capacity with pieces of pure distilled zinc, placed into a furnace, and through the neck a current of dry carbonic acid gas is passed. Its tubulure is closed with an imperfectly fitting stoneware stopper, to permit the escape of CO_2. Heat being applied, as soon as the zinc boils, small pieces of dry phosphorus are from time to time dropped in through the opening, the stopper being instantly replaced after each addition. From time to time the crust of phosphide of zinc formed must be broken up with an iron rod, in order to expose new metal to the action of the phosphorus. Finally the retort is strongly heated, so as to cause the remaining uncombined zinc to melt together at the bottom. The mass is removed, the phosphide of zinc reduced to fine powder, and the metallic zinc reserved for another operation. Any pieces which do not powder easily must be removed, as the compound is the more brittle the closer it approaches in composition the formula Zn_3P_2. In this condition it resembles reduced iron, and no other sort should be used. It is completely soluble in hydrochloric acid. Phosphide of zinc crystallizes in right-angled prisms with rhombic base and of metallic lustre. Its density is 4.72. It is friable, slate-colored when powdered, and unalterable in air. Dilute hydrochloric, sulphuric, and tartaric acids decompose it, producing the corresponding zinc salts, and causing the disengagement of gaseous phosphuretted hydrogen. It is administered in pills, containing eight milligrams of the compound, representing one milligram of phosphorus. New Rem., Sept. 1878, p. 285.

CUPRUM.

Copper—New and Economic Method of Preparation from Copper Pyrites.—Hugh M. Nilso recommends the following economic method, whereby two waste products are utilized. The burnt ore obtained from the pyrite kilns is treated with waste chloride of manganese liquor from the chlorine stills, which is pumped on to a layer of the ore several successive times. A large portion of the copper contained in the ore is thus extracted by means of the free acid always present in the still liquor. The chloride of copper solution is then run on to a sufficient quantity of soda waste to convert the whole of the copper into sulphide by means of the sulphuretted hydrogen disengaged from the waste. The manganese and calcium salts now in solution can easily be separated from the sulphide of copper, which is thrown on to a drainer, well washed, and afterwards heated on iron plates in order to convert it into sulphate of copper, which is then treated with boiling water and allowed to crystallize. Ch. News, Feb. 15th, 1878, p. 65.

Copper Allotropic—Modification.—By the electrolysis of certain cuprous solutions, P. Schützenberger obtained an allotropic modification of copper which is less red than ordinary copper, brittle, absolutely devoid of malleability, and of the sp. gr. 8.0 to 8.2. If washed with water and exposed to the air it is oxidized with great rapidity. Pure nitric acid diluted with ten parts of water attacks it very strongly, with the escape of protoxide of nitrogen almost pure, the metal becoming covered with a blackish-olive layer. Ordinary copper is scarcely attacked at all by so weak an acid. With a stronger acid it evolves nitric oxide. Heat, or the prolonged action of dilute sulphuric acid, converts the abnormal metal into ordinary copper. Chem. News, June 28th, 1878, p. 274; from Compt. Rend., May 20th, 1878.

Copper—Absorption of Hydrogen by the Powder and by Wire.—Fresenius has already drawn attention to the fact that copper, reduced by hydrogen, is unsuited for elementary analysis on account of the tenacity with which it retains a portion of the hydrogen. Lietzenmayer has now observed that the spiral nets of copper wire used in elementary analysis, also retain hydrogen with tenacity. even when the heat is raised to 160° C. (= 320° F.). Ph. Centralh. No. 21, 1878, p. 198; from Br. d. Deut. Ch. Ges.

Copper—A Delicate Test.—L. Cresti has communicated to Deutsch. Chem. Ges. (Ber. x, 1099), a very sensitive test for copper, which has been tried by R. C. Woodcock, and found available for the detection of 0.0000008 gram Cu, the author claiming its availability to 0.000001 gram only. A zinc platinum element is formed of two thin wires which is then placed in the solution to be tested. Should there be much copper present the platinum becomes covered almost immediately with a blackish deposit; but if the solution is very dilute it is necessary to leave the wires in for some hours, when the platinum will, of course, be only slightly, if at all, colored. The platinum wire is now removed, washed with water, and exposed, without previous drying, for a few moments, to the action of hydrobromic acid and bromine vapor, obtained by heating a small quantity of bromide of potassium with strong sulphuric acid. The deposit becomes deep violet. The color may be more easily recognized by rubbing the platinum wire on a piece of porcelain. The author (L. Cresti) believes the color to be due to bromide of copper dissolved in hydrobromic acid. Ch. News, Nov. 30th, 1877, p. 240.

Copper—Guaiacum Resin as Reagent for its Salts.—Schœnbein pointed out that the compounds of copper in presence of hydrocyanic acid or cyanides produce indirectly the reactions of ozone, and in particular that of giving a blue color with tincture of guaiacum. Enrico Purgotti finds that besides cyanides, ferrocyanides, nitroprussides, sulphocyanides, the alkaline and alkaline-earthy chlorides produce the same effect. Chem. News, June 21st, 1878; from Gazz. Chim. Italiana, 1878.

Sulphate of Copper—Reducing Action of Phosphorus.—Sidot has allowed sticks of phosphorus to lie for some months in a cold saturated solution of sulphate of copper, and has obtained a series of copper tubes, the outer surface of which was covered with octahedral crystals of the metal. In this reaction the water is decomposed, metallic copper and phosphide of copper are formed, whilst sulphuric and phosphoric acids remain in the liquid. Ch. News, July 20th, 1877, p. 34; from Compt. Rend., June 18th, 1877.

PLUMBUM.

Lead—New Sesquioxide.—H. Debray has found that there exists a sesquioxide of lead, or rather compound of plumbic acid and protoxide of lead in equal equivalents, quite distinct from the sesquioxide, commonly so called, which is merely a mixture. The sesquioxide is not decomposed by the influence of heat, as is the general case with direct compounds, like carbonate of lime. Such bodies, if heated in a limited space at a temperature where their decomposition begins, cease to be decomposed when the temperature of the gas evolved in the apparatus has acquired a certain value dependent solely on this temperature. But the sesquioxide of lead is split up into oxygen and minium, which, at least in the circumstances indicated above, is not capable of re-oxidation. The sesquioxide, therefore, under the influence of heat behaves like carbonate of lead, or any other indirect compound. Chem. News, March 22d, 1878, p. 122; from Compt. Rend., Feb. 25th, 1878.

STANNUM.

Tin—Quantitative Determination.—Pellet and Allart recommend that the solution in hydrochloric acid from which iron, copper, and antimony have been removed, be treated with solution of ferric chloride, of known strength, until a faint brown color is produced, and that the excess of ferric chloride be then determined volumetrically with protochloride of tin. The formula of the reaction would be as follows:

$$Fe_2Cl_6 + SnCl_2 = 2\ FeCl_2 + SnCl_4\ (O = 16).$$

Ph. Centr. H., Dec. 13th, 1877, p. 423.

Stannous Chloride—Determination with Ferric Chloride.—G. Pellet and A. Allart propose a method of titration, based upon the observation of Löwenthal, that stannous chloride, in acid solution, is readily converted into stannic chloride by ferric chloride (also cupric chloride). The solution of stannous chloride, which must be free of iron, copper, and antimony, is heated to boiling and a quantity of pure zinc (2–3 grams Zn. to 0.1 gram Sn.) and an excess of hydrochloric acid are added. A portion of tin is at first precipitated, but is eventually redissolved, and all the tin is then in the condition of stannous chloride. A titrated solution of ferric chloride is now added to the boiling solution until a faint brownish color results, indicating that the stannous chloride has been completely converted into stannic salt. Deducting 0.05 to 0.01 cc. for the excess of solution of ferric chloride necessary to produce the faint brown color, the remainder yields figures by which the quantity of stannous chloride is readily determined. Cupric chloride can be substituted, with equally accurate results, for ferric chloride. Ph. Centr. H., Aug. 23d, 1877, p. 273.

Phosphide of Tin—Composition.—S. Natanson and G. Vortmann prepared phosphide of tin by the following methods:

1. Heating a mixture of 3 p. glacial phosphoric acid, 1 p. charcoal, and 6 p. tin.
2. Melting glacial phosphoric acid with tin.
3. Passing phosphorous vapor over melting tin in a current of hydrogen.
4. Throwing phosphorus upon melting tin.

The product of each method was silvery-white, foliated-crystalline in structure, and soluble in hydrochloric acid with evolution of phosphide of hydrogen.

The analysis of product of No. 1 proved it to be composed of 97.97 Sn and 1.52 and 1.37 P. Its sp. gr. was 6.793. When heated to redness in a current of hydrogen it gave off 0.997 per cent. phosphorus. When this phosphide of tin is heated with nitric acid for a short time and hydrochloric acid is then added until the liquid which has become turbid on the addition of stannic acid again becomes clear, and gentle heating is then continued for some time, a residue remains, which is composed of small, yellowish metallic glistening leaflets. These, on analysis, prove to contain 74.979 and 75.028 per cent. of tin. This compound is not affected by nitric acid until after very prolonged boiling, but is dissolved by hydrochloric acid with evolution of phosphuretted hydrogen, while a yellow, pulverulent body is deposited, which, upon the addition of nitric acid, is also dissolved. When a weighed quantity of this compound was boiled with hydrochloric acid for some time, and is then treated with nitric acid, 5.7848 per cent. of phosphorus, which had not escaped as phosphide of hydrogen, was found in the solution. By boiling the compound with solution of potassa, a brownish-yellow solution was formed, while phosphuretted hydrogen escaped and silvery-white leaflets remained undissolved. These were repeatedly boiled with solution of potassa, washed with water, and dried at a gentle heat. On analysis, they proved to contain 79.527 per cent. of tin. The formula ZnP would require 78.89 per cent. of tin.

The phosphide of tin made by the method No. 2 yielded 0.746 and 0.827 per cent. of phosphorus. The 3d method yielded a product containing 96.551 Sn and 2.856 P. Ph. Centr. H., Dec. 20th, 1877, p. 434.

VANADIUM.

Vanadiate of Ammonium—Precipitation from Alkaline Vanadiates.—The precipitation of the alkaline vanadiates by chloride of ammonium had been already applied by Sefström and Berzelius, and was recommended by V. Hauer for the quantitative separation of vanadium from the alkalies, and since then adopted in all textbooks. B. W. Gerland has recently made use of this method for a quantity of potassium sodium vanadiate containing several kilograms of vanadic pentoxide, and obtained the ammonium salt, which, carefully washed, yielded a pentoxide that crystallized beautifully when solidifying from its molten state, but contained, nevertheless, a considerable amount of alkalies. Subsequent experiments proved the alkali to be potassium, and that vanadiate of ammonium cannot be obtained free from potassium by precipitation with chloride of ammonium if the solution contains potassium, whilst the presence of sodium salts does not interfere with the purity of the vanadiate. The obstinacy with which potassium is restrained by vanadium compounds is remarkable. It is not limited to the vanadiate of ammonium separated from alkaline solutions, but also manifests itself with different compounds of other oxides of vanadium, whether they are formed in acid or alkaline liquors. Ammonium behaves to some extent similarly to potassium. Several metallic salts of vanadic acid—for instance, ortho-vanadiate of copper—contains ammonium present in the liquor in which they are formed, and the latter cannot be removed by washing. Ch. News, July 20th, 1877, p. 29.

The author has also contributed a method for the analysis of *Vanadium sulphates* and their double salts with alkaline sulphates, and has outlined a method for the estimation of vanadium by titration with permanganate. He finds, furthermore, that the stability of *tetroxide* of vanadium in acid solutions recommend them as convenient for the valuation of standard solutions of permanganate. Ibid., Dec. 21st, 1877, pp. 271–3.

Vanadiate of Ammonium—Technical Application.—R. v. Wagner has made a series of experiments, with a view to the technical application of this interesting compound, which lead him to the following results:

Tannic acid gives with vanadiate of ammonium (10.0 tannic acid and 0.2 vanadiate) the reaction described by Berzelius. The precipitate is so fine that it remains suspended for several days, especially if a little gum senegal is dissolved in the liquid to give it consistence. The liquid resembles ordinary gall-nut ink very closely.

Gallic acid reacts like tannic acid, but a decided precipitate is formed, which separates partially. The filtrate is black, but it does not possess the blue tint that the tannic acid communicates.

Pyrogallic acid yields a deep blue-black liquid, but no precipitate, and furnishes a very good ink, as has been noted several years ago by R. Böttger (see Proceedings, 1874, p. 54).

Morintannic acid (maclurin), in aqueous solution, also yields a deep-black liquid, which, however, has a greenish tint.

Hæmatoxylin gives with the vanadiate precisely the same reaction as do the alkaline bichromates. The deep blue-black liquid may be used as ink. With extract of logwood it furnishes, when operating similarly as with bichromates, a fine black dye for silks and woollens. With Brazilwood a black-brown color is produced; with pure brasilin a dark-violet color, free from black tint; with fustic a greenish-black color. The vanadiate has no reaction upon phenol, salicylic acid, resorcin, hidroquinon, caffeia, eosin, or fluoresceïn. With genuine red wines the vanadiate produces a deep red-brown color; Bordeaux wine, adulterated with tannin, yields an inky liquid. Ph. Centralh., July 19th, 1877, p. 235.

MOLYBDANIUM.

Molybdate of Ammonium.—H. Uelsmann attributes the formation of an insoluble precipitate in solutions of molybdate of ammonium in nitric acid, pointed out by Jungck, to silicious or other impurities in the nitric acid. The author has exposed a 6-liter white glass bottle full of the solution to the sun for five weeks, when not the slightest alteration was produced in the liquid. He considers this sufficient proof that the precipitate is not produced by light. Fresenius appends a note to the author's paper, in which he states, that the formation of a yellow precipitate in the most carefully prepared molybdate solutions cannot be denied, and requires investigation. J. Chem. Soc., Aug. 1877, p. 222; from Zeitschr. f. Anal. Chem. xvi.

Jungck had remarked (Zeitschr. Analyt., ch. xv, p. 290) that the yellow precipitate, formed in the so-called molybdic solution used for the precipitation of phosphoric acid, is due to the action of light, and is a metameric form of molybdic acid. This precipitate is easily soluble in ammonia, and is even formed in dark-green bottles, although in rather smaller quantities. Uelsemann asserts that even direct sunlight has no action on this solution of molybdate of ammonium in nitric acid. Sergius Kern, having often remarked the formation of yellow precipitates in such solution, has made some recent experiments, and finds that in pure molybdic solution, free from phosphorus, no yellow precipitate is formed at once or in some hours, but that on standing several weeks, especially if the bottles are often opened, a yellowish-white precipitate is formed. He regards this precipitate as the basic molybdic salt, occasioned by the elimination of a portion of the ammonia every time the bottle is opened, and not a metameric form of molybdic acid. By exposure to light for one month, a notable quantity of yellowish-white precipitate is formed both in white and black bottles, the quantity being greater, however, in the white than in the black. These precipitates readily dissolve in ammonia, as observed by Jungck. Ch. News, March 8th, 1878, p. 98.

TELLURIUM.

Telluride of Zinc (ZnTe).—J. Marcottet finds that tellurium and zinc combine, with incandescence, at a temperature between the melting-points of the two substances. The resulting mass has a metallic lustre, and gives a cinnabar-red powder. When it is heated in a porcelain tube in a gentle current of hydrogen, ruby-red crystals are deposited in the cooler part of the tube. These crystals are regular hexagonal prisms with trihedral summits, and have a sp. gr. 6.34 at 15 C. (= 59° F).

Telluride of Cadmium (CdTe) may be prepared by heating cadmium with tellurium to about 500° C. (= 932° F.). The product is amorphous and has a metallic lustre. Crystals may be obtained in the same way as with the zinc compound. They are black, very brilliant, hexagonal prisms, belonging to the regular system, and exhibiting octohedral and cubical faces. Sp. gr. 6.20 at 15° C. (= 59° F.).

The composition of both compounds was determined by dissolving the crystals in concentrated nitric acid, evaporating the solution to dryness, precipitating the tellurium by sulphurous acid, and the zinc or cadmium by carbonate of sodium. J. Chem. Soc., Nov. 1877, p. 570; from Compt. Rend., v. 84.

BISMUTHUM.

Bismuth—Detection.—The mixture of equal parts of iodide of potassium and sulphur recommended by Von Kobell for his excellent blowpipe test for bismuth, has, according to W. H. Hutchings, the great disadvantage of being very deliquescent; even if kept in closely stoppered bottles it sooner or later becomes pasty, and indeed almost semiliquid. The author, therefore, endeavored to replace the iodide of potassium by some iodide which, serving the same purpose, would be free from the disadvantage of deliquescence, and found such to be the iodide of copper. Von Kobell's mixture has another disadvantage, viz., that it itself yields a *white* sublimate, the brilliant red sublimate obtained when it is used with a substance containing a good deal of bismuth being caused by the mixture of this white with the dark brownish red given by iodide of bismuth alone. When very little bismuth is present and a good deal of the mixture is used, the white frequently overpowers the red almost completely, and when other metals are present which also give white or light-colored sublimates, it greatly assists in concealing the bismuth color. This disadvantage is also got rid of by using iodide of copper and sulphur. The precipitated iodide of copper is washed free from all traces of potassium salts, dried perfectly, and then ground up to an intimate mixture with an equal volume, or rather more, of flowers of sulphur. On aluminium plate (see "Blowpipe Work," under Processes) the author finds it more delicate as a reagent than the iodide of potassium mixture, using in each case 2 volumes of reagent to 1 volume of powdered substance to be tested, intimately mixing to a paste and gently heating on a charcoal slip. The merest trace of the dark brownish-red bismuth iodide is conspicuous on the clean aluminium. On ordinary charcoal or blackened porcelain support the dark-colored bismuth iodide is not near so conspicuous as on aluminium, and does not show as well as the brighter red obtained by using iodide of potassium. But a few tests with a substance containing very little bismuth will convince that aluminium plate, with the copious iodide mixture, is very much preferable to charcoal and iodide of potassium. Ch. News, Dec. 7th, 1877, p. 249.

Referring to the opinion expressed by Mr. Hutchings, that Von Kobell's test "deserves to rank as one of the best—in some cases the best—test for bismuth," Frederick Field draws attention to a test proposed by Prof. Abel and himself, in a paper read before the Chemical Society as far back as the year 1862, which he considers far more delicate than Von Kobell's test, since 0.00025 grain of bismuth may be detected by it in copper with the greatest ease. The mode of operation of applying this test is as follows: "About 100 grains of the copper to be examined are dissolved in nitric acid, a solution of nitrate of lead, equal to 5 grains of the salt, is added, and subsequently ammonia and carbonate of ammonia. The solution (precipitate ? Rep.) is washed with ammoniacal water, and dissolved in warm acetic acid. Considerable excess of iodide of potassium is introduced, and the liquid is warmed until the precipitate disappears. On cooling, the crystalline scales will show by their color the presence or absence of bismuth." The test is dependent upon the circumstance, that when the least trace of bismuth is present along with a lead salt, the iodide of lead crystallizing out under the conditions named, is no longer in yellow scales, but they assume an orange or crimson tint, varying in intensity of color according to the amount of bismuth present. Ibid., Dec. 14th, 1877, p. 260.

Bismuth—Delicate Test.—In his "Researches on Bismuth" (Poggendorff's Annalen, 88, p. 45), R. Schneider described a reaction of bismuth, which appeared to M. M. P. Muir applicable to the determination of small quantities. On trial, however, he found the reaction not delicate enough to serve as the basis of a quantitative colorimetric method, but he considers the reaction the means of detecting very small quantities of bismuth. The author prepares, after a modification of Schneider's directions, a test liquid as follows: 4 grams of stannous chloride are dissolved along with 12 grams of crystallized tartaric acid in such a quantity of tolerably strong solution of caustic potash as serves to produce a clear liquid having a distinct alkaline reaction. This liquid must remain perfectly clear when it is warmed for some time to a temperature of 60° or 70° C. (= 140° or 158° F.). To the solution supposed to contain bismuth, a considerable quantity of tartaric acid is added; it is warmed, made alkaline by the addition of potassa, a few cc. of the test liquid are added, the mixture warmed to 60° or 70° (= 140° or 158° F.) for a few minutes, and the beaker is placed upon a piece of white paper. The production of a brownish-black color shows the presence of bismuth, one part in 210,000 parts of liquid being thus detected. Mercury, copper, and manganese alone interfere with this reaction: the first named metal, if present, must certainly be removed before applying the test; copper and manganese must be present in comparatively large amount to interfere. Cadmium yields a white precipitate without any shade of brown or black; lead, arsenic, antimony, iron, cobalt, nickel, and chromium yield no precipitates, and the liquid is not darkened. Mercury yields a grayish-black precipitate, copper a yellowish-red precipitate, and manganese a yellowish-red solution, which gradually darkens. J. Chem. Soc., July, 1877, p. 45.

Bismuth—Determination.—Buisson and Ferray have (in Monit. Scient., T. 3, p. 900) recommended the quantitative determination of bismuth by titration with iodic acid. The solution of the bismuth preparation in nitric acid is diluted with water, carbonate of sodium is added to permanent turbidity, acetic acid is then added to strong acid reaction, and the liquid is boiled, in order to precipitate any basic chloride and oxide of iron that may be present. After these are filtered off, iodic acid is added in excess (for 0.5 gram subnitrate of bismuth 25 cc. of a solution of 30 grams crystallized acid to 1 liter of water), the mixture is diluted with water to 250 cc. and filtered. The excess of iodic acid is then determined, after addition of iodide of potassium and sulphuric acid, by titration with hyposulphite of sodium, $\frac{1}{6}$ of the iodine found being, however, calculated as iodic acid. The calculation is made on the assumption that the compound formed with iodic acid contains 3 eq. of iodine and 2 eq. of bismuth ($Bi_2O_5,3IO_5$), and that this compound is anhydrous. J. Löwy has now made a number of experiments to determine the reliability of this method, and gives the details of these. He concludes, that the method cannot be recommended for the following reasons:

1. The quantity of iodic acid consumed did not correspond to the quantity which, upon the basis of the above formula was calculated to be required for the quantity of subnitrate of bismuth used.

2. The weight of the iodate of bismuth obtained did not correspond to that expected.

3. The precipitation of the bismuth as iodate was incomplete, being more in one and less in another instance.

4. The iodate remaining in solution renders the determination of the excess of iodic acid difficult and consequently inaccurate. Arch. Ph., Nov. 1877, p. 407.

Nitrates of Bismuth.—The formulas that have been given from time to time for the acid nitrate of bismuth vary in the quantity of water of crystallization, which is given at from 3 to 17 equivalents. Yvon has undertaken a series of experiments, which lead him to the conclusion, that by whatever method obtained—whether in presence of excess of acid or when this is deficient, or by the evaporation of the acid solution from which the subnitrate has been precipitated—the crystallized salt has the same composition: $BiO_3.3NO_5,11HO$. When this salt is heated at 140° C. (= 284° F.) until completely decomposed, a nitrate of constant composition, and corresponding to the formula, $BiO_3,NO_5.\frac{1}{2}HO$, is formed. This subnitrate is also obtained by the action of alkaline earths. When the subnitrate is precipitated by water, it is found to have the composition, BiO_3,NO_5,HO; if the quantity of water is so large that no immediate precipitate can form, handsome crystals of the compound $BiO_3,NO_5.\frac{1}{2}HO$ will deposit in the course of several weeks. He regards this compound to be the normal nitrate.

If the precipitated subnitrate, of the composition BiO_3,NO_5,HO, is washed with water for some time, a new compound, having the composition $5BiO_3,NO_5,6BiO_3,11HO$, is finally formed. This same compound is formed when the precipitation is effected in the presence of alkali.

A. Ditte, referring to the above, states that he had obtained similar results, which he communicated in 1874. He finds that the numerous formulas attributed to nitrates of bismuth do not belong to them. The nitrate, $BiO_3,3NO_5,3HO$, is split when brought in contact with water into nitric acid and a crystalline subnitrate, BiO_3,NO_5,HO. This may be further decomposed, so as to form a second basic salt, $2BiO_3,NO_5$, which is then no longer affected by water. Ph. Centr. H., Sept. 27th, 1877, p. 319.

Subnitrate of Bismuth—Detection of Plumbic Oxides.—A. Carnot takes from 10 to 29 grams of subnitrate and treats it with strong hydrochloric acid in a porcelain capsule. The solution is concentrated to a syrup, slightly acidified so as to render it perfectly fluid, a few drops of sulphuric acid are added, and 30 to 40 cc. of alcohol. If the alcohol is too weak, a white turbidity appears in the liquid, which may be got rid of by the addition of a little hydrochloric acid. It is allowed to stand for a day, decanted over a small filter, washed by decantation with alcohol, acidified with two or three drops of hydrochloric acid, the precipitate received on a filter, and the washing completed with pure alcohol. When dry the filter is separated, burnt by itself, the ashes added to the residue in a very small balanced porcelain capsule, moistened with sulphuric acid, evaporated, heated to redness, and the residue weighed as sulphate of lead. Ch. News, May 3d, 1878, p. 184; from Compt. Rend., March 18th, 1878.

ARSENICUM.

Arsenic—Assimilation by Particular Organs.—D. Scolosuboff has experimented in order to determine whether the paralysis and atrophy of the muscles, which is observed in the extremities of animals and man, when treated with arsenical preparations, is due to the accumulation of arsenic in the muscles. The experiments, which were both physiological and chemical, determine, however, that the metal is not assimilated to any important extent in the muscles, but that the nerve tissues, in particular, appear to retain it. The liver retains but small quantities. The author experimented with dogs, hares, guinea pigs, and frogs. The method of extraction, recommended by Gautier, consisted in digesting the organic substance with nitric acid, to which a little sulphuric acid had been added, evaporating to near dryness, adding some more sulphuric acid, continuing the heat until sulphuric acid began to vaporize, adding nitric acid, drop by drop, upon the mass, heating to incipient carbonization, and treating with hot water. The filtrate is treated with a current of sulphuretted hydrogen for some time, is heated, the sulphide of arsenic is allowed to subside, converted into arsenic acid, and this is treated in Marsh's apparatus. One hundred grams of the fresh muscle of a bulldog, treated for thirty-four days with arsenic, in daily doses, gradually increased from 0.005 to 0.150 gram, was thus found to contain 0.00025 gram of arsenic (metal); the same quantity of the liver 0.00271, of the brain 0.00885, and of the spinal marrow 0.90933 gram. Experiments with other animals varied somewhat, but corresponded in the essentials. The author concludes, that in cases of arsenic poisoning, the poison should preferably be searched for in the brain and spinal marrow. Its occurrence principally in the nerve-tissue, may perhaps be explained, in that it performs the part of a substitute for the phosphorus. Arch. Ph., Nov. 1877, p. 404.

Arsenic—A New Way of Separation from other Metals.—Supposing a mixture of arsenic, antimony, and tin, De Clermont and Frommel convert into sulphides by treatment with sulphuretted hydrogen, after having acidulated with hydrochloric acid, and adding also tartaric acid if antimony is present. When the mixture is saturated it is allowed to stand in a warm place till the odor of sulphuretted hydrogen is no longer perceptible, and is then thrown upon a filter and washed with much care, as the least residue of hydrochloric acid will cause a loss of arsenic in the state of chloride. The whole is then transferred into a flask full of water, and heated to a boil. The reaction is more rapid in a retort through which a current of air is passed. If the quantity of arsenic does not exceed two decigrams the distillation of 500 to 600 cc. of water suffices for the complete dissociation of the sulphides. The residue is then filtered, and the entire quantity of the arsenious acid is found in the filtrate, and determined by the ordinary methods. Ch. News, May 10th, 1878, p. 196; from Compt. Rend., April 1st, 1878.

Arsenic—Estimation as Pyroarsenate of Magnesium.—The method of determining arsenic as arsenate of magnesium, has long been recommended, but it has been a question whether it be preferable to weigh the precipitate on the filter, or to convert it into pyroarsenate. Both methods are open to objection; the first on account of the multiplicity of weighings, and possible loss of water by slight excess of temperature; the second, because of unavoidable loss of arsenic on igniting the filter-paper. B.

Brauner, however, recommends the latter method, which, as modified by him, affords accurate results. The precipitation is effected with magnesia mixture, and the addition of half its bulk of alcohol. The mixture is allowed to stand over night, the clear liquid decanted, the precipitate dissolved in hydrochloric acid, reprecipitated as before, thrown into a small filter, and washed with a mixture of 1 vol. ammonia, 2 vols. of alcohol, and 3 vols. of water. When dried, it is introduced as completely as possible into a small porcelain crucible included in a larger platinum one, moistened with nitric acid, covered and heated, at first gently, afterwards to a bright redness. The residue on the filter is then washed into a second—rather large—porcelain crucible, with a little nitric acid and water, the liquid evaporated, and the residue heated in the same manner as the precipitate which had been removed from the filter. The two residues are weighed as pyroarsenate, and the results are accurate. Zeitschr. Anal. Chem., 1877, p. 57.

Arsenic—Reliability of Reinsch's Copper Test.—The reliability of this test has been questioned recently, in connection with an examination for arsenic in Sweden. A. Hirschberg, who regards the test to be perfectly reliable, draws attention to the fact, that the film of arsenic which the copper assumes, when examined under a good lens, presents *a glistening*, *amalgam-like*, *scarred* surface, observable even when the faintest traces of arsenic are present in the liquid; whilst acids simply corrode the surface of the copper and cause it to present a dull appearance. This he regards as absolute proof of the presence of arsenic, independent of the reactions which may be obtained by the further examination of the film deposited on the copper. As long as 30 or 40 years ago a Prussian scientific deputation had recommended this test as reliable for the detection of arsenic in wall papers. Ph. Centralh., August 30th, 1877, p. 284.

Arsenuretted Hydrogen—Reaction with Acids.—H. Parsons has determined the following reactions of arsenuretted hydrogen with acids: Oxalic acid produces no reaction; nitrous acid produces arsenious acid, arsenic acid, and nitric oxide; nitric acid produces the same; sulphhydric acid produces no reaction; sulphurous acid produces metallic arsenic, and probably a low sulphide of the same; sulphuric acid produces metallic arsenic and sulphurous acid; ferro- and ferri-cyanhydric acids produce no reaction; sulphocyanhydric acid, no reaction; chlorine produces arsenious, arsenic, and hydrochloric acids; hydrochloric acid, no reaction; hypochlorous acid produces arsenious, arsenic, and hydrochloric acids; chloric acid, no reaction in neutral or acid solutions, but produces in alkaline solutions metallic arsenic and hydrochloric acid; bromine produces arsenious, arsenic, and bromhydric acids; bromhydric acid, no reaction; iodine produces arsenious, arsenic, and iodhydric acids; iodhydric acid, no reaction; iodic acid produces arsenious acid and iodine; hypophosphorous acid, no reaction; permanganic acid produces in neutral solutions arsenic acid and manganic oxide, in acid solutions arsenious and arsenic acid and salt of manganous oxide, in alkaline solution arsenious and arsenic acids and manganic oxide; chromic acid, no reaction in neutral or acid solutions, but in alkaline solution produces metallic arsenic and chromic oxide. Ph. Centralh., Aug. 23d, 1877, p. 274.

Arsenic—Antidote.—Hans M. Wilder draws attention to the superiority of the antidote of arsenic—hydrated oxide of iron—of the German Pharm., over that of the U. S. Pharm., in that its preparation is more expeditious. Sixty parts of tersulphate of iron solution are mixed with 120 parts of water, and a mixture of seven parts of calcined magnesia and 120 parts of water is added, the mixture well shaken and dispensed at once. The sulphate of magnesium formed is not objectionable for the use to which the mixture is applied. A. J. Ph., Sept. 1877, p. 441.

Metallic Arsenides—Formation.—A. Dechamps, on attempting to prepare metallic arsenides by submitting arsenites or arseniates to the reducing action of hydrogen, carbonic oxide, or coal-gas, obtained very imperfect results. He also reduced arseniates in a crucible with the cyanide of potassium in excess, so as to form a liquid layer which might preserve the compound from the action of the atmosphere. In these experiments he continued the application of heat till arsenical vapors no longer escaped. With many metals, however, arsenic does not form absolutely definite compounds, but alloys, which, after being heated for a certain time, may lose arsenic and change their composition. He has also prepared arsenides by the direct action of metallic arsenic upon the metal in a current of hydrogen, or, preferably, by heating the metal in a crucible along with excess of arsenic and borax as a flux. The arsenides of copper, gold, and silver have been prepared by placing metallic arsenic in solutions of sulphate of copper, sulphate of silver, or chloride of gold. Ch. News, May 31st, 1878, p. 227; from Compt. Rend., April 22d, 1878.

ANTIMONIUM.

Antimony—Estimation in Alloys.—E. H. Bartley recommends the following method: The alloy is decomposed by nitric acid, the excess of nitric acid is neutralized by ammonia, and the whole is digested with yellow sulphide of ammonium, until the antimony is entirely dissolved. The solution, after filtration, is digested with hydrochloric acid until sulphuretted hydrogen ceases to be evolved, and the supernatant liquid becomes clear; the precipitate is collected, washed free from hydrochloric acid, and removed from the filter to a beaker. The filter is washed with bromine (water? Rep.), which is again removed by means of water. The contents of the beaker are heated with a little nitric acid free from hydrochloric acid; if any sulphur remains unoxidized, a little more bromine is added. The contents of the beaker are evaporated to a small bulk, transferred to a porcelain crucible, evaporated to dryness, ignited, and weighed as Sb_2O_4 ($O = 16$). J. Chem. Soc., Aug. 1877, p. 222.

HYDRARGYRUM.

Mercury—Reduction as Practiced in California.—According to Paterna (Bull. de la Societe Chem., No. 7, April 5th, 1877), the cinnabar is converted into calomel by the action of chloride of copper; the calomel is dissolved in hyposulphite of sodium, and sulphide of mercury is then precipitated by sulphide of sodium. The process is tedious and costly. Sieverking describes another process in the "Mining and Scientific Press" of San Francisco. He places the ground ore in casks with granulated copper, or, preferably, an alloy of copper and zinc, and agitates the mixture for twelve hours with a hot solution of chloride of copper. When a sample taken out shows the total decomposition of the cinnabar, a small quantity of zinc amalgam is added, which effects the precipitation of all the copper which has remained in solution, and causes the agglomeration of that portion of mercury which has been deposited in a pulverulent state. The agitation is continued for some time; the casks are then filled with water and allowed to settle. The amalgam, which is very compact, subsides; the liquid is carefully decanted and distilled; the residue from this distillation serves for the preparation of chloride of copper for succeeding operations. Ch. News, July 13th, 1877.

Solidified Mercury—Sp. Gr.—Mullet, in consideration of the conflicting results of previous experimenters, has undertaken and completed careful experiments, determining the sp. gr. of solid mercury to be 14.1932 at its freezing-point (—38.85° C. = —37.93° F.) and compared with water at 4° C. (= 39.2° F.). Zeitschr. Œst. Ap. Ver., Dec. 1st, 1877, p. 550.

Yellow Oxide of Mercury.—J. B. Gille finds that the usual method of precipitating mercuric chloride, with solution of soda or potassa, generally contaminates the product with mercuric carbonate, because the two caustic alkalies are hardly ever free from carbonate when in solution. The mercuric carbonate might be removed by heating, but a better plan, according to the author, is to precipitate by perfectly clear lime-water, decanting and filtering immediately to prevent the formation of carbonate of calcium in the supernatant liquid, which should contain an excess of lime. Prepared by lime, it has a paler yellow color than if prepared by soda or potassa. New Rem., Sept. 1877, p. 271; from Rep. de Ph., 1877.

Calomel—Alterability.—Jolly has investigated the action of various physical and chemical agents upon calomel. *Heat* always causes decomposition to a greater or less extent. Perfectly pure and dry calomel, sublimed alone, takes a grayish tinge from the liberation of metallic mercury. *Light* causes the change into mercury and corrosive sublimate to take place rapidly, as evidenced by the change of color. *Hydrochloric acid*, dilute, *chloride of sodium*, *citric acid*, *sodic hydrate*, *magnesia* and *calcic hydrate*, and *carbonate of sodium*, all give rise to more or less corrosive sublimate when the calomel is digested for six hours in their solutions. Neither *calcic* or *magnesia* carbonate have an effect during that period. A. J. Ph., Dec. 1877, p. 611; from Chem. and Drug., Oct. 1877.

Action of Certain Manipulations and Reagents.—Fred. M. Cornin has made a series of experiments to ascertain whether *mercuric* salts were produced from calomel by certain physical or chemical agents. *The physical agents* were trituration, boiling with water, and sublimation.

Trituration for some time with a pestle in a dry porcelain mortar for some time caused the calomel to assume a yellowish tint. After a half hour's trituration the calomel was treated with water, the mixture filtered, and the filtrate acidified with hydrochloric acid. No evidence of mercuric salt was obtained, either by immersing copper into the filtrates, or by the acion of hydrosulphuric acid. By

Boiling with water for about fifteen minutes, filtration, evaporation to one-half, and acidification with hydrochloric acid, a solution evidently containing *mercuric* salt was obtained; a deposit being formed on copper, while hydrosulphuric acid occasioned the characteristic precipitate indicative of such.

Sublimation.—By causing the calomel to sublime *slowly* in a dry test-tube, the sublimate yielded nothing to water; but when the sublimation was *rapid*—the glass tube being red-hot—the sublimate afforded a filtrate, which gave characteristic reactions both with copper and with hydrosulphuric acid.

Chemical Agents.—These were acids and salts. About a drachm of the calomel was placed in a five-inch test-tube, which was nearly filled with the acid; or a half drachm of the calomel was treated in the same way with a solution of a salt (1–10, except chlorate of potassium = 1–20), the mixture being macerated, with occasional agitation, for three days and then filtered; the filtrate being in case of the acids evaporated to one-half. The following table shows the results:

Filtrate.	Copper.	Hydrosulphuric acid.	Appearance.
Hydrochloric acid.	Deposit.	Characteristic precipitate.	Unchanged.
Nitric "	Not used.	" "	"
Sulphuric "	No action.	No action.	"
Nitrohydroch'ic "	Not used.	Characteristic precipitate.	"
Hydrocyanic "	Deposit.	" "	Turns dark.
Phosphoric "	No action.	No action.	Unchanged.
Potass. Brom.	Deposit.	Characteristic precipitate.	Lead color.
" Chlorate.	No action.	No action.	Unchanged.
" Cyanide.	Deposit.	Characteristic precipitate.	Dark nearly blk.
" Hypophos.	No action.	No action.	Unchanged.
" Nitrate.	" "	" "	"
" Sulphate.	" "	" "	"
" Sulphite.	" "	" precpt'te, separat'n of S	Greenish gray.
" & Sod. Tart.	Deposit.	Characteristic precipitate.	Unchanged.
Ammon. Bromide.	"	" "	Slate color.
" Chloride.	"	" "	Unchanged.

Ammon. Iodide.	Deposit.	Orange-red precipitate, which gradually turns dark, same as $HgCl_2$ in NH_4I.	Turns yellow, then dark with green tint, solution is yellow.
" Nitrate.	"	Character'tic precipitate.	Dark at point of contact, gray on agitating.
" Sulphate.	"	" "	Unchanged.
Sodic chloride.	"	" "	"
Ferric "	No action.	No action.	"
" Pyrophosph.	" "	" "	"

Of the two following salts, about a drachm of each was rubbed with an equal bulk of calomel in a porcelain mortar, for fifteen minutes. The mixtures were then macerated with water, filtered and filtrates acidified.

Subnitrate of Bismuth: no deposit in copper; with H_2S produced a peculiar precipitate, which was not characteristic of Hg.

Ferrocyanide of Iron: no reaction with either reagent. New Rem., July, 1877, p. 211.

Corrosive Sublimate—Contamination with Arsenic.—Experiments made in the laboratory of the Philadelphia College of Pharmacy have demonstrated that commercial corrosive sublimate is frequently contaminated with small quantities of arsenic, which impurity is most likely derived from the sulphuric acid used in its manufacture. Owing to the small quantity present the impurity is not readily recognized by treating the precipitated sulphides with sulphydrate of ammonia, but is readily recognized by the aid of Marsh's apparatus, or by Fleitman's test. For the purpose of determining the quantity of the impurity, Joseph Granville Smith endeavored to separate the two metals by various methods, and the following two methods were found to yield accurate results:

Determination as Sulphide.—The acidulated solution was completely precipitated by sulphuretted hydrogen, the precipitate treated with sulphide of ammonium, the filtrate acidulated with acetic acid, and the precipitate washed, dried, and weighed. It was then oxidized with nitro-muriatic acid, the separated sulphur weighed as such, whilst the portion dissolved was estimated as sulphate of barium. The entire weight of the sulphur thus ascertained was then deducted from the weight of the precipitate by acetic acid and the difference being metallic arsenic, calculated to arsenic acid (in which form it is present in the corrosive sublimate).

Determination as Arseniate of Lead.—The solution was precipitated by sulphuretted hydrogen, the precipitate treated with sulphide of ammonium and the filtrate evaporated to dryness. The residue was oxidized with nitric acid, heated upon a sand-bath until the sulphur and excess of nitric acid had evaporated, then thoroughly mixed with an excess of recently ignited pure oxide of lead, heated to dull redness, care being taken to prevent loss by decrepitation, and weighed. From this was deducted the previously ascertained weight of the crucible and oxide of lead, the difference being the weight of the arsenic acid.

Five samples were thus examined, with the following results:

Determination as	1	2	3	4	5	
Sulphide, . .	0.0537	0.048	0.032	0.083	0.0901	per cent. of arsenic acid.
Arseniate of lead,	0.054	0.052	0.0333	0.091	0.0962	

A. J. Ph., Aug. 1877, p. 397.

Proto-iodide of Mercury—Crystalline Form and Optical Properties.—The researches of Des Cloizeaux determine the crystals of this salt to belong to the quadratic system, but might be mistaken for a clino-rhombic combination, in consequence of their strong flattening on the two parallel faces of the fundamental square prism, and of the very unequal development of the octahedron a^1. The measurement of their angles yields numbers almost identical with those received for the protochloride of mercury (*calomel*), so that the two salts offer the most complete geometrical and optical isomorphism. It is worthy of remark that they are also geometrically isomorphous with biniodide of mercury. Ch. News, July 20th, 1877, p. 34; from Compt. Rend., June 18th, 1877.

Mercurous Iodide.—Schlagdenhauffen has examined the various processes recommended for preparing this compound, and arrived at the conclusion that, even after prolonged trituration of mercury and iodide in the proper proportion, there results a mixture of metallic mercury and mercurous-mercuric iodide. If prepared by double decomposition of mercurous salt (nitrate) and potassium iodide, a mixture of variable proportion of the same constituent results, and if a sufficient excess of potassium iodide is employed, the yellow precipitate disappears with the formation of potassio-mercuric iodide, leaving metallic mercury behind. A. J. Ph., Dec. 1877, p. 598; from Jour. Phar. d'Alsace-Lorr. 1877.

Mercurous Iodide.—Le Canu recommends the following method, which yields a product which is entirely free from mercuric iodide, and, therefore, does not need washing with alcohol. 5 grams of mercury are triturated with 20 drops of alcohol, replacing the latter as it evaporates, until the mercury is completely extinguished. 3 grams of iodine are then added, in small portions, with brisk trituration. The product is then finished in 10 minutes. Arch. Ph., March, 1878, p. 276; from Rép. de Ph. 1877, p. 140.

Bibasic Nitrate of Mercury, or Turbith Nitrate.—The following formula for its preparation has been adopted by the Pharm. Soc. of Paris: Crystallized neutral nitrate of mercury, 1 part; boiling water, 10 parts. Powder the crystals as finely as possible, and stir them into the boiling water, with constant agitation. As soon as the powder has become greenish-yellow let it deposit. Decant the supernatant liquid and wash the precipitate several times with cold water. Turbith nitrate is a pale greenish-yellow powder, insoluble in water, but entirely soluble in pure nitric acid. Potassa turns it black. On igniting it strongly it emits reddish fumes and vapor of mercury, leaving no residue. New Rem., Aug. 1877, p. 254.

ARGENTUM.

Sulphide of Silver—Electric and Chemical Deportment.—W. Skey had in a previous paper stated that argentic sulphide is a good conductor of electricity for a sulphide. This statement has given rise to some controversy, and the impression seems to prevail that it is not a conductor in the sense that a metal is—*i. e.*, not without decomposition. The author was, therefore, induced to repeat the experiments upon which his opinion was founded, and by these second experiments concludes and maintains that argentic oxide can be a conductor of electricity, and, for a sulphide, a very good one.

Regarding the chemical deportment of argentic sulphide, the author finds, contrary to what is alleged respecting it, that it is soluble in cyanide of potassium, and at common temperatures; auric sulphide is also soluble in this salt; platinic sulphide scarcely so. Furthermore he finds, contrary to what has been heretofore supposed, that argentic sulphide is decomposed by mercury, though very slowly, mercuric sulphide and silver amalgam resulting; auric sulphide is also very slowly decomposed in the same way; lead sulphide (galena) is not. Ch. News, July 27th, 1877, p. 36.

THALLIUM.

Platinocyanide of Thallium—R. J. Friswell and A. J. Greenaway have reinvestigated this compound, which one of them had obtained in 1873 and had found to be colorless crystalline and of the composition Tl_2PtCy_4 ($O = 16$). He had also obtained a body forming dark-red crystals and reflecting a green metallic light, which yielded on analysis numbers leading to the formula, $Tl_2PtCy_4CO_3Tl_2$ ($O = 16$). Since then the authors have found that Carstanjen had as early as 1867 described a compound, which he called platinocyanide of thallium, and to which he gave the composition PtCyTlCy, and, consequently corresponding in formula to the compound obtained by one of the authors; but Carstanjen had described his compound to be in the form of blood-red needles, which showed by reflected light a splendid metallic green surface iridescence. The present careful experiment of the authors proves the correctness of the former observations of one of them. The red crystalline salt is a compound of platinocyanide of thallium and carbonate of thallium, produced by treating hydroplatinocyanic acid with carbonate of thallium in excess. The colorless crystalline compound is platinocyanide of thallium, corresponding in composition to the formula above given. It is produced when hydroplatinocyanic acid is treated with exactly one equivalent of carbonate of thallium, and may also be produced—as it was originally by one of the authors—by treating the red crystalline salt with warm nitric acid, and recrystallizing the undissolved portion from water. J. Chem. Soc., Sept. 1877, p. 251.

Thallium Pigments.—Thos. W. Salter had prepared for Messrs. Winsor and Newton a series of thallium pigments which, at the International Exhibition of 1871, had excited attention on account of their extraordinary beauty. In his edition of "Field's Chromatography" the author had remarked on thallium yellow, red, and orange, and as the observations in that work appear to comprise all or nearly all that has been written on thallium pigments, he now supplements them with the mode of manufacture of the Exhibition colors referred to, as well as with some remarks on their value as pigments.

1. *Lemon Yellow* was prepared by adding a very dilute cold solution of ammoniacal chromate of potassium to a very dilute cold solution of nitrate of thallium, the resulting precipitate being rendered still paler by subsequent admixture with alumina. The color was washed with cold water by decantation, collected on a filter, and carefully dried on a white porous tile exposed to a warm atmosphere.

2. *Pale Yellow* was prepared by adding a hot solution of chromate of potassium to a cold solution of the thallium. When dilute ammonia was added to the moist washed precipitate, the lemon-yellow variety was produced; but the dried pale-yellow pigment was not changed on the addition of ammonia.

3. *Middle Yellow* was produced by carefully and gradually adding very dilute ammonia to the orange yellow obtained in 5, until the desired tint was arrived at.

4. *Deep Yellow* was obtained on precipitating the nitrate of thallium solution with a solution of 2 parts of chromate and 1 part of bichromate of potassium.

5. *Orange Yellow* is formed by adding a solution of equal parts of chromate and bichromate of potassium.

6. *Orange Red* is made by mixing hot solutions of nitrate of thallium and bichromate of potassium. The orange precipitates are more bulky than the deep yellow, just as the deep yellow are more bulky than the pale and lemon yellow.

7. *Red* was obtained by adding a boiling mixture of equal parts of strong nitric acid and water to the washed orange-red precipitate, and allowing the solution to stand over night. The crystalline deposit formed was then washed with cold water and dried without heat. Sufficient acid must be employed to completely dissolve the orange pigment.

8. *Orange Brown*, or *Subdued Orange*, is obtained by carefully heating the finely ground orange-red powder over sand. If a mixture of equal parts of orange red and pale yellow are so heated, *a brownish* or *subdued yellow* is obtained. When the orange red is ignited for some time in a porcelain crucible the powder fuses and liquefies, becomes solid on cooling, and then forms a highly polished mahogany-colored cone, very hard and weighty. This yields on grinding a rich *orange-brown* powder, of a gritty texture.

9. *Green* is obtained by initimately mixing the yellow chromate

of thallium with three times its weight of boracic acid, and carefully igniting in a clay crucible. A small quantity of boiling water is added to the green mass thus formed, and the pigment is afterwards washed with cold water. By varying the proportions, either yellow, yellow green, or blue green may be produced.

10. *Olive Green* is obtained by adding a mixed solution of nitrate of thallium with half its weight of green vitriol, to a mixed solution of chromate of potassium with half its weight of red prussiate.

11. *Brown.*—This is precipitated from a cold solution of thallium, by somewhat dilute sulphide of ammonium. Another brown is formed when a mixed solution of caustic potash and red prussiate is added to nitrate of thallium.

In regard to the stability of these beautiful pigments, the author finds, contrary to expectation, that they do not suffer by exposure to sulphuretted hydrogen. Light and air, however, affect some of them decidedly; the *orange yellow, orange red* and *orange brown* are not affected, and being pure, brilliant, of good body, working well, and entering kindly into admixture, might lay a claim as pigments for the palette, but for the presence of superior and far cheaper pigments of the same class of color. Ch. News, March 8th, 1878, p. 96.

AURUM.

Gold—Determination in presence of Arsenic, Copper, Iron, and Zinc, in Regulus of Antimony.—A. Gawaloozki gives the following method, based upon an experience of several years, which is specially applicable to large quantities of materials employed to insure accuracy: One hundred grams of the powdered regulus is melted in a roomy porcelain crucible (inserted into a Hessian crucible) with zinc, which must be free from gold; the molten mass is poured on a porcelain tile, broken into pieces and dissolved in dilute sulphuric acid, at first without heat, subsequently with heat. The antimoniuretted (and possibly, also, arseniuretted hydrogen) is passed through a solution of nitrate of silver, in which these elements may be determined by well-known methods. After gas ceases to be evolved, the liquid is boiled, allowed to cool, and the undissolved portion repeatedly washed with water, whereby copper, zinc, and iron, are completely removed. The residue is now dissolved in aqua regia, evaporated to dryness, softened with, and then dissolved in alcohol, filtered through glasswool, and this washed with alcohol until the liquid passes colorless. The alcoholic solution is evaporated on a water-bath, extracted with ether, the ethereal solution evaporated in a tared porcelain crucible, well dried, and heated to redness; the residue is then weighed as gold. The author has applied the method, with good results, to the analysis of antimony ores, the process being for this purpose slightly modified. Ph. Centr. H., Aug. 16th, 1877, p. 265.

Arsenate of Gold.—This compound may be prepared by mixing 1.8 grams of chloride of gold and sodium (Ph. Germ.) with 0.55 gram of neutral, dry arsenate of sodium, rubbing the mixture with 1 gram of water, and drying again at a moderate temperature. It appears to have been used in triturations, by homœopathists, and extraordinary powers have lately been attributed to it, as a remedy in nervous affections of every variety. New Rem., May, 1878, p. 139.

PLATINUM.

Platinum Metals—Extraction.—Opificius communicates the following method of extracting the platinum metals in German refineries: The ferric chloride resulting from refining gold, contains, in addition to gold in suspension, platinum, palladium, silver chloride, iridium, and rhodium in solution, as well as copper, antimony, lead, bismuth, arsenic, tin, selenium, and tellurium. This solution is treated with iron, which yields a pulverulent metallic deposit containing the elements mentioned. After the mechanical removal of compact fragments of iron, the finely divided iron is removed by digestion with ferric chloride, which dissolves at the same time a part of the copper, and also a part of the palladium, if the digestion is carried too far. The residual deposit is dilute hydrochloric acid, dried and melted with carbonate of sodium and charcoal. The selenium is found in the scoriæ as seleniate of sodium. The regulus is granulated and treated with *aqua regia* with an excess of hydrochloric acid insufficient for the removal of all the metal, the first object being to dissolve out the copper, as this metal impedes the separation of the platinum and palladium. This operation is repeated several times till all the copper is dissolved. The last solution contains a part of the palladium, which may be reprecipitated by the introduction of a fine copper wire. The remaining metal is then entirely dissolved in *aqua regia*, diluted with water to throw down the antimony, then concentrated again, and mixed with ferrous chloride to precipitate the gold. It is, however, better to precipitate the gold by the galvanic method and then separate the platinum as chloro-platinate of ammonium, which, on ignition, leaves platinum sponge, containing not more than 0.5 per cent. of impurities. The mother-liquids from the chloro-platinate containing an excess of sal ammoniac, serve for the precipitation of fresh portions of platinic liquids, and thus, at the same time, the palladium from several operations is concentrated into one liquid. On concentration the rest of the chloro-platinate crystallizes, and in the final mother-liquors the palladium is thrown down as yellow chloride of palladammonium by the addition of hydrochloric acid and ammonia in slight excess. Chem. News, March 15th, 1878, p. 112.

Platinum.—A. Gaiffe finds that if atmospheric dust is carefully excluded during the operation of drawing platinum wires, the wire is more tenacious. Ch. News, Oct. 19th, 1877, p. 182; from Compt. Rend., Oct. 1st, 1877.

Chloroplatinites.—This name is assigned to the compounds of the metals with the so-called chloroplatinous acid, or $2HCl, PtCl_2$ ($O = 0.16$). L. F. Wilson prepared this acid by heating the tetrachloride to 300° C. (= 572° F.), dissolving in HCl, purification in the form of a barium salt, and separation from the latter by sulphuric acid. The solution of chloroplatinous acid cannot be concentrated without decomposition, a dark-brown amorphous powder, easily soluble, and losing at 100° C. (= 212° F.) a second molecule of HCl. The author obtained from the solution of the acid salts with most of the metals, and describes their preparation and properties. They are mostly very soluble and deliquescent. They form handsome, large crystals of a dark-red color, and with few exceptions, contain water of crystallization, often in large quantities. The glucinum salt would tend to show that that metal is divalent. The valence of the hexivalent metals is, however, not so sharply marked as in other groups of salts. Ch. News, Oct. 19th, 1877, p. 183; from J. f. prakt. Ch., No. 6–7, 1877.

Platinum Compounds—Preparation.—J. Thomsen has simplified or altered the methods of obtaining the following compounds pure and in large quantities:

Chloroplatinite of potassium is prepared by reducing K_2PtCl_6 with cuprous chloride.

Platinous chloride ($PtCl_2$), in solution with hydrochloric acid, is obtained by adding a concentrated solution of $PtCl_4$ in HCl to a hot saturated solution of chloroplatinite of potassium, the resulting potassio-chloride of platinum (K_2PtCl_6) being completely precipitated. The various double salts, the chloroplatinite, are obtained from this solution by the addition of solutions of chlorides.

Platinous hydrate is formed by boiling chloroplatinite of potassium with exactly enough caustic soda to finish the decomposition, *i. e.*, two molecules.

Bromoplatinite of potassium results by boiling chloroplatinite of potassium (K_2PtCl_4) and bromide of sodium with a small amount of water.

Bromoplatinite of sodium results from boiling platinic chloride ($PtCl_4$) with six molecules of hydrobromic acid, adding two molecules of bromide of sodium and evaporating. (In the formulas given in the above $O = 16$.) Ch. News, Oct. 19th, 1877, p. 183; J. f. prakt. Chem., 6–7, 1877.

PALLADIUM.

Palladium.—Gesechus, at a recent meeting of the Russian Physical Society, made some remarks on the elasticity of metallic palladium. Preliminary experiments showed the coefficient of elasticity to be 16.000 (platinum = 17.000). Hydrogenated palladium (Pd_2H) has a rather lower coefficient = 14.400; this number remained the same even after three or four days, when a certain quantity of hydrogen was liberated. The diminution of the palladium wire could be observed for more than two days. Ch. News, July 27th, 1877, p. 39.

Palladium—New Compound.—H. Sainte-Claire Deville and H. Debray observe that on heating a solution of chloride of palladium, PdCl, with strong nitric acid in presence of sal-ammoniac, the palladium is converted into an ammonio-chloride, $PdCl_2 + NH_4Cl$, which precipitrates in small regular octahedra of a fine red color, sparingly soluble in water, and like the corresponding compounds of iridium and platinum, amost insoluble in concentrated solution of sal ammoniac. The authors thought that on treating certain mother-liquors, containing ammoniacal palladium chloride and excess of ammonium chloride, with aqua regia, the metal would be entirely thrown down as a double chloride—an expectation not fulfilled. Instead of the desired compound they obtained a reddish-black substance, Pd_2Cl_3, $2NH_3$, the result of the combination of ammonia with a palladium chloride hitherto unknown. Ch. News, May 24th, 1878, p. 216; from Compt. Rend., April 15th, 1878.

RUTHENIUM.

Ruthenium—Physical and Chemical Properties.—According to the recent investigations of H. Sainte-Claire Deville and H. Delray, ruthenium forms, like osmium, a volatile oxide—*per-ruthenic acid* ($= RuO_4$), which is readily distinguished from osmic acid ($= OsO_4$). It is formed by melting the pure metal with potassa and nitre, treating the fused mass with water, saturating the orange-yellow solution with chlorine, and distilling on a water-bath in a current of chlorine. The per-ruthenic acid collects in the receiver and condenses in the form of golden-yellow globules and crystals. When the potassic solution of per-ruthenic acid is treated with alcohol, *ruthenic oxide* is formed. This oxide is reduced to the metallic state by the action of illuminating gas. By melting the metal with 5 times its weight of tin, and treating the alloy with hydrochloric acid, a compound of equivalents of tin and ruthenium, in the form of cubical crystals, remain undissolved, from which the tin may be removed by heating in a current of dry hydrochloric acid gas. The crystalline ruthenium so obtained has a sp. gr. of 12.261. Per-ruthenic acid does not unite with bases. It is decomposed by potassa, oxygen is evolved, and a dark-green compound, of the composition $KO+Ru_3O_7$, is formed. By the action of chlorine on this compound the potassa is removed from its combination, and per-ruthenic acid is again formed. The authors name the following acids of ruthenium:

Ruthenious Acid $= RuO_3$; forms with potassa an orange-yellow compound.

Hepta-ruthenic acid $= Ru_2O_7$, forms the above-mentioned dark-green compound with potassa.

Per-ruthenic acid, or per-ruthenic oxide $= RuO_4$, which does not unite with potassa, is volatile, and is decomposed, with explosion, when heated to 108° C. (= 226.4° F.). Zeitschr. Œst. Ap. Ver., Aug. 20th, 1877, p. 391; from Compt. Rend.

NEW METALS.

Davyum—A New Metal.—Sergius Kern has extracted from a platinum-sand a new metal, which he has named davyum, in honor of Sir Humphry Davy. The platinum-sand was composed of 80.03 platinum, 9.15 iridium, 0.61 rhodium, 1.35 osmium, 1.20 palladium, 6.45 iron, 0.28 ruthenium, and 1.02 copper (= 100.9). To separate the metals, it was treated according to the analytical method of Bunsen. The mother-liquor obtained after the separation of the rhodium and iridium was heated with chloride and nitrate of ammonium in excess. The dark-red precipitate produced yielded when heated to redness a gray platinum sponge-like mass. This was melted in the oxyhydrogen flame and yielded a metallic button of silvery color, and weighing (from 600 grams of ore) 0.27 gram. The density of davyum is 9.385 at 25°C. (= 77° F.). It is hard, but malleable when heated, is readily acted on by aqua regia, but very little by boiling sulphuric acid. It is precipitated yellow from its solutions by potassa; sulphydric acid precipitates it brown, becoming black on drying; sulphocyanide of potassium produces in its solution a red color, the same as in ferric chloride solutions, and in concentrated solutions a red precipitate. The author believes this new metal to occupy—in the classification of Mendelejew—a place between molybdenum and ruthenium, in which event the equivalent of davyum would be 100. The author hopes to communicate the results of further experiments, relating to the chemical and physical characters of the new metal, at an early date. Ph. Centralh., Dec. 6th, 1877, p. 417.

Gallium.—M. Lecoq de Boisbaudran exhibited at the Académie des Sciences, a bar, a sheet, and several crystals of the new metal, Gallium, which is harder than iron, yet melts under the heat of the finger, its freezing-point being about 30° C. (= 86° F.). It is proposed to use it for a thermometer going up to a red heat. 60 grams of the metal were obtained from 5000 kilograms of ore, and it will now be possible to investigate its physical properties. It adheres to glass, and is very brittle; the color is nearly that of steel, and the crystals are octahedra. Ch. News, Feb. 22d, 1878, p. 78.

Notwithstanding the relative great hardness of gallium it leaves distinct marks, of a bluish gray, upon paper. It preserves its lustre in a laboratory where the air is always loaded with acid vapors;

it remains brilliant in boiled water, but tarnishes very slowly in water containing air. When in a state of fusion it is white, like tin or silver. When crystallized gallium is thrown into hot water it crackles and lets bubbles of air escape. Its oxide is soluble in ammonia to a considerable extent. M. Lecoq de Boisbaudran and E. Jungfleisch have prepared the anhydrous chloride, iodide, and bromide. The chloride is scarcely yellowish, and perfectly pure. The atomic weight has been determined by M. de B. to be 69.9, but has since been corrected by him to 69.86. Chem. News, April 5th, 1878, pp. 138 and 142; Ibid., May 24th, 1878, p. 216; from Compt. Rend.

A. Dupré, who had received some of the metal from M. de Boisbaudran, has studied its relations to oxygen and to nitric acid. Pure dry oxygen exerts no influence on the metal until it is heated to incipient redness, when it gradually becomes coated with oxide. Monohydrated nitric acid does not affect it in the cold; at 40 to 50° C. (= 104 to 122° F.) the metal begins to be regularly dissolved. By heat the salt is partly decomposed, and finally leaves the sesquioxide, in the form of a white, fritted, very friable mass, after losing 63.8 per cent. of its weight. This, when heated to cherry redness, assumes a bluish-gray color, but does not seem to be reduced to the metallic state to any appreciable extent. It dissolves in nitric as well as in dilute sulphuric acids without giving rise to vapors or gas. The grayish-blue matter appears to be a lower oxide of the metal. By mixing the sulphate of the sesquioxide of gallium with the sulphate of ammonium it yields gallic alum, whilst the salt, which appears to be sulphate of protoxide, produces nothing similar. Ibid., May 3d, 1878, p. 184.

Lecoq de Boisbaudran has prepared alloys of gallium with several metals, and has particularly studied those of gallium and aluminium. If the proportion of the latter is to be considerable, the two metals are heated together up to dull redness. The alloys thus obtained remain brilliant and do not sensibly absorb the oxygen of the atmosphere during their preparation. After cooling they are solid, but brittle, even when the excess of aluminium has raised the melting-point up to incipient redness. They decompose water when cold, but better at 40° C. (= 104° F.), with rise of temperature, escape of hydrogen, and formation of a chocolate-brown powder, which is ultimately resolved into white flakes of alumina; almost the whole of the gallium is liberated in the form of globules, which appear quite free from aluminium. These alloys generally decompose water like an amalgam containing a medium proportion of sodium, but in certain cases the reaction is as brisk as with sodium itself. The escape of hydrogen caused by a solid alloy is considerably augmented by the contact of a globule of liquid gallium. A galvanic element is evidently formed, of which the aluminium is the oxidizable metal. Superfused gallium dissolves aluminium even below 15° C. (= 59° F.), forming a brilliant liquid or pasty alloy, not easily attacked by air, but decomposing water very readily. As regards its alloys gallium seems to possess properties in common with mercury and lead. Chem. News, June 28th, 1878, p. 274; from Comp. Rend. May 20th, 1878.

ORGANIC CHEMISTRY.

HYDROCARBONS.

Hydrocarbons from Wood-tar.—Dr. George Thenius, on repeatedly rectifying the oils obtained in the distillation of wood-tar, obtained finally five hydrocarbons, boiling at constant temperatures, and differing in specific gravity, which the author designates and describes as follows:

1. *Iridol;* boils at 47° C. (= 118.4° F.); sp. gr. 0.660. It has an aromatic ethereal odor, strongly refracts light, and is decomposed by chlorine—passed through it—into a camphor-like body, crystallizing in white needles (a chlorine compound) and a new oil of strong *aromatic* odor.

2. *Citriol;* boils at 52° C. (= 125.6° F.); sp. gr. 0.700. It has a distinct turpentine odor, is much less refracting than iridol, and yields with chlorine a secondary colorless distillate, which is identical in odor with that of *oil of lemons.*

3. *Rubidol;* boils at 57° C. (= 134.6° F.); sp. gr. 0.750. It, as well as the two following, has very little odor, and does not refract light. Treated with chlorine, rubidol yields a secondary distillate, having the odor of *raspberries.*

4. *Coridol;* boils at 60° C. (= 140° F.); sp. gr. 0.800; yields

with chlorine a secondary distillate having the odor of *oil of coriander*.

5. *Benzidol;* boils at 70° C. (= 158° F.); sp. gr. 0.850; yields with chlorine a distillate having a strong odor of *cinnamon*. New Rem., June, 1878, p. 175; from Dingt. Polyt., Jena.

Nitro-benzole—Presence in Alcoholic Beverages.—Henry G. Debrunner has analyzed a sample of a so-called genuine "French brandy," which constituted a clear colorless liquid, had a remarkably strong smell of oil of bitter almonds, and similar to what is termed "Kirschwasser" in Germany, was said to be made of cherries. The odor of bitter almond oil was, however, much stronger than that of genuine "Kirschwasser," and the analysis proved it to be due, not to oil of bitter almonds, but to essence of mirbane—or nitro-benzole. It was separated by subjecting the "brandy" to distillation on a water-bath, shaking the turbid and milky residue in the retort with ether, separating the upper from the lower that formed, and evaporating spontaneously, when a yellow, oily liquid, which was identified as a mixture of nitro-benzole and fusel oil. The nitro-benzole was converted into anilin and its characteristic color-reactions were produced by the following method, which the author recommends:

A small quantity of the ethereal extraction of the residue of distillation is placed in a test-tube and evaporated at about 100° F. A few drops of dilute hydrochloric acid and a small quantity of very fine iron filings (or reduced iron), together with a sufficient quantity of water, are then introduced. As soon as the oily drops of nitro-benzole have disappeared, the supernatant liquid is poured off into another test-tube. It consists of ferrous chloride and hydrochlorate of anilin. By decomposition with caustic soda, shaking with ether, etc., the alkaloidal anilin is extracted in the usual manner. The ethereal solution of anilin, if evaporated on a watch-glass, and treated with a few drops of hydrochloric acid and a small crystal of chlorate of potassium, gives rise to a beautiful blue pigment. The color changes gradually into a light green and disappears entirely in a short time, particularly if, as in this case, the quantity of anilin is small. By placing the watch-glass on a sheet of white paper, minute quantities of anilin are thus detected. A. J. Ph., Oct. 1877, p. 495.

Acetylene—Liquefaction.—This gas, best produced by passing the vapor of chloroform over ignited copper, has hitherto resisted all attempts to liquefy it. Cailletet, however, has succeeded in accomplishing its liquefaction by means of the same apparatus used by him in the liquefaction of oxygen (which see). At 1° C. (= 32° F.) it requires 48 atmospheres; at 10° C. (= 50° F.), 63 atmospheres; at 25° C. (= 77° F.), 94 atmospheres; and at 31° C. (= 87.8° F.), 103 atmospheres. It forms a colorless, very mobile liquid, lighter than water, which dissolves it. It is a solvent for paraffin and fats. New Rem., April, 1878, p. 116; from J. de Ph. et de Chim., 1878.

Paraffin Oils.—Dr. Stevenson Macadam, during a lengthened series of experimental observations on different paraffin oils, found that certain oils burned somewhat imperfectly in different lamps, and an examination of these oils led to the discovery that they were contaminated so largely with lead compound as to lead to the choking up of the wicks, and ultimately to the lessening and practical extinguishment of the light. In order to determine how far paraffin oil could act upon lead, as well as other metals, such as tin, copper, iron, zinc, etc., a series of experiments were undertaken, by which he determined that a bright surface of lead is very rapidly acted on, a tarnished surface slowly; tin is slightly acted on, and not sufficient to impede its combustion; copper and iron are very slightly affected; zinc is sensibly acted on, and its illuminating power is decidedly injured. The experiments demonstrate that the metals lead and zinc should not be employed in the construction of, or in the lining of cisterns or other vessels intended for the storage or reception of paraffin oils. Tin, copper, or iron may be safely used; galvanized iron should be avoided; but the most suitable would be enamelled iron. The paraffin oils employed in the experiments were of excellent quality and were free from acid or alkali. Ph. J. Trans., Dec. 15th, 1877, p. 463.

VOLATILE OILS.

Volatile Oils—Color Reactions.—In a former paper (referred to in the Report for 1875–6, see Proceedings, p. 277), Prof. Dragendorff has shown that many volatile oils, when they are mixed with food-mixtures, etc., may be separated by distillation, agitation of the distillate with petroleum-ether, boiling below 40° C. (104° F.), and evaporation of the solution at the temperature of the room. In this connection he had communicated some color-reactions, which were thought to be useful for the identification of volatile oils. In the second edition of his "Ermittelung von Giften" he has besides drawn attention to the fact, that other oils besides that of *Ledum palustre* are dissolved with a brown color, changing to violet by sulphuric acid, a reaction proposed by Trapp for the identification of the latter oil. It is also stated that a mixture of sulphuric acid and ferric chloride dissolves the oil of Ledum palustre with a violet color, and that this color is changed to green if the oil is employed in chloroformic solution. With a view to determining in how far other volatile oils are similarly affected by these reagents, experiments were made in Prof. Dragendorff's laboratory by Mr. Kossow, the results of which are given in the table appended to this. The observations made during these experiments also show that the above-mentioned reaction of oil of Ledum palustre, and the reaction of *ledum-camphor*, cannot be regarded as conclusive evidence of their presence, and that their presence must be confirmed by other characteristics—such as crystalline form, odor, etc.

Regarding the experiments, the results of which are given in the table, the author remarks: that the sulphuric acid was of the greatest possible degree of purity, that the tests with ferric chloride were made with a mixture of pure concentrated sulphuric acid and $\frac{1}{6}$ vol. of a solution of 1 p. ferric chloride in 20 p. water, and that for each drop of oil 2–3 drops of the reagent (sulph. acid, or the ferric chloride mixture) were employed, the oil and reagents being brought in contact upon a porcelain plate. When chloroformic solutions were employed, 1 drop of the oil was dissolved in 1 cc. of chloroform, 1–2 drops of the reagent added, and the mixture preserved in a securely corked test-tube. In the latter mixture there are, of course, two layers formed, and these are generally differently colored. These two layers are indicated in the table; the sulphuric acid, or its mixture with ferric chloride, by *S*, and the chloroformic solution by *Chl.* The oils designated with * are such as have been prepared in the author's laboratory. It is to be regretted, that the reactions given in the table cannot be made with solutions of the volatile oils in petroleum-ether, whereby the examination of oils thereby extracted could be greatly simplified. But Mr. Kossow has found that the color reactions either do not appear, or they are insufficient, because the colored products of the decomposition of the

	OILS	WITH FERRIC CHLORIDE AND CONCENTRATED SULPHURIC ACID	WITH CHLOROFORM, FERRIC CHLORIDE AND CONC. SULPHURIC ACID			WITH CHLOROFORM AND CONC. SULPHURIC ACID		
		Change of color of mixture when the [illegible] on cardboard	Immediate	After 30 minutes	After 48 hours	Immediate	After 30 minutes	After 48 hours
1	+ Ledum-camphor	Faint brownish, red-brown, reddish-violet	S. Pale yellowish Chl. Colorless	Faint dirty violet Colorless	Unchanged Blue-violet	S. Pale yellowish Chl. Colorless	Yellowish-red Light orange-red	
2	+ Ol. Ledi palustr. [illegible]	Dark brown [illegible] in thin layers cherry-red, magenta [illegible] cherry-red and lilac	S. Violet Chl. Colorless	Black-brown Colorless	Brown Wine-red	S. Yellow to cherry-red Chl. Colorless	Dark brown Wine-red	Black-brown Dark brown-red
3	Camphora	Colorless, pale rose, colorless	S. Chl. Unchanged			S. Chl. Colorless	Pale yellow Colorless	Yellowish Light rose
4	Mentha-camphor	Colorless, faint gray-brown, colorless	S. Chl. Colorless	Colorless	Brown-red Wine-red	S. Chl. Colorless	Pale yellow Colorless	Dirty yellow Unchanged
5	+ Ol. Menthae pip.	Red-brown, dark black-brown, black-brown	S. Dark red-brown Chl. Blood-red	Black-brown Dirty violet	Brown Light-reddish	S. Orange Chl. Colorless	Red-brown Wine-red	Red-brown Reddish-brown
6	+ Ol. Menthae crisp.	Dark red-brown, mahogany-brown, deep dark cherry-red edge and red violet	S. Violet-brown Chl. Pale violet	Dark violet Violet	Brown Dirty brown	S. Yellow Chl. Colorless	Brown-red Wine-red	Brown-red Dark wine-red
7	Ol. Pulegii	Orange-[illegible], in thin layers rose, the edge near [illegible] red, [illegible] yellowish-red	S. Chl. Colorless	Nearly colorless	Colorless	S. Yellow Chl. Colorless	Orange Pale rose	Orange-red Dirty red
8	Ol. Salviae	[illegible]-brown, red-brown edge, orange-red with [illegible]-gray [illegible]	S. Orange changing to red Chl. Colorless	Cherry-red Dirty blue	Dark green Green	S. Yellow to orange Chl. Colorless	Dark brown [illegible] red-brown	Dark brown Reddish brown
9	+ Ol. Majoranae	[illegible] brown [illegible] orange-red, bluish-green edge	S. Orange, rapidly red Chl. Colorless	Dark cherry-red Violet	Brown Handsome blue-green	S. Orange Chl. Colorless	Light red-brown Pale violet	Light red-brown Dirty violet
10	+ Ol. Rosmarini	Dark red-brown, the edge red, orange-red with grayish-gray spots	S. Orange, then red Chl. Pale rose	Dark cherry-red Violet	Yellow-brown Blue-green	S. Orange to red Chl. Colorless	Red-brown Pale violet	Dark brown Dirty violet
11	Ol. Lavandulae Adulterated	Red-brown, dark-[illegible], blackish	S. Orange, then red Chl. Colorless	Dark cherry-red Violet	Brown Dirty blue	S. Yellow-red Chl. Colorless	Red-brown Brown	Red-brown Violet-red
12	Ol. Thymi	Yellow-brown, [illegible] with blue-gray edge, dark blue spots	S. Nearly colorless Chl. Colorless	Olive-brown Faint violet	Brown Bluish	S. Orange Chl. Colorless	Orange-red Pale rose	Yellow-brown Light brown-red
13	+ Ol. Carvi	Dark gray-[illegible]-yellow changing to orange, here and there red, cherry-red	S. Chl. Colorless	Dirty brown Colorless	Brown Greenish	S. Yellowish-green Chl. Colorless	Dark orange Pale rose	Dark-brown Brown-red
14	Ol. Anethi	Orange-brown, red edge, here and there cherry-red	S. Chl. Colorless	Olive-brown Faint violet	Dark brown Dirty green	S. Orange Chl. Colorless	Red-brown Light wine-red	Dark brown Indefinite
15	+ Ol. Petroselini	Dark [illegible], black-brown, dirty violet	S. Chl. Colorless	Colorless Yellowish-brown	Dirty olive-green Colorless	S. [illegible] brown to cherry-red Chl. Colorless	Dark cherry-red Colorless	Cherry-red Handsome red-violet
16	Ol. Coriandri	Mahogany-brown, bluish edge, dark brown	S. Brownish, changing to red Chl. Colorless	Cherry- to blood-red Faint violet	Brown Becomes colorless	S. Reddish-brown Chl. Colorless	Dark cherry-red Light brown	Indefinite
17	+ Ol. Anisi	Light yellow changing to yellowish-brown and red, dirty brown, violet shaded	S. Chl. Colorless	Faint red-brown Faint rose	Reddish-brown Faint yellowish	S. Orange changing to red Chl. Colorless	Carmine-red	Cherry-red Handsome light violet
18	+ Ol. Foeniculi	Light yellow, like 17	S. Chl. Colorless	Pale reddish-brown Colorless	Cherry-red Nearly colorless	S. Orange Chl. Colorless	Dark cherry-red Handsome light wine-red	Indefinite
19	Ol. Anisi stell.	Like 17	S. Chl. Colorless	Reddish Faint rose	Cherry-red Becomes colorless	S. Orange Chl. Colorless	[illegible] when thin rose Carmine-red	Red-brown Indefinite
20	Ol. Macidis Prepared by Zeise	Mahogany-brown, pure red edge	S. Dark orange Chl. Colorless	Brown Faint reddish	Brown Green	S. Like 19 Chl.	Brown Pale rose	Dirty brown Indefinite
21	Ol. Eucalypti	Like 2?, [illegible] violet streaks	S. Dark brown-red Chl. Colorless	Black-brown Brown-violet	Dark-brown Colorless	S. Chl.		
22	+ Ol. Caryophyll.	Immediately green, then black, violet-brown to black	S. Dark orange to red Chl. Colorless	Cherry-red Dirty green	Dark cherry-red Greenish	S. Red to blood-red Chl. Colorless	Dark cherry-red Light wine-red	Unchanged Cherry-red
23	Ol. [illegible]	Bright mahogany-brown changing to blood-red, shaded black	S. Dirty brown Chl. Colorless	Dark cherry-red Faint violet	Cherry-red Handsome violet	S. Chl. ……		
24	Ol. Pimenti Prepared by Zeise	[illegible] black-brown-violet edge	S. Like 22 Chl.	Dirty olive-green Colorless	Brownish Gray-violet	S. Like 2? Chl.	Like 23 Dirty violet	Brown-red Indefinite
25	Ol. Valerianae	Immediately [illegible] nearly black with faint pale rose edge, bluish streaks	S. Chl. Colorless	Gray-brown Bluish	Unchanged	S. Yellowish Chl. Colorless	Unchanged	Unchanged
26	+ Ol. Cinae	Mahogany-[illegible] blood-red, blackish	S. Dark orange changing to blood-red Chl. Colorless	Brown-red Dirty violet	Unchanged Blue-green	S. Red-brown Chl. Colorless	Dark-brown Brownish	Indefinite
27	Ol. [illegible]	Mahogany-colored, black-brown, black-violet edge	S. Brown, then brown Chl. Nearly colorless	Gray-brown Violet	Unchanged	S. Yellow-orange Chl. Colorless	Brown Reddish-brown	Brown Light violet
28	Ol. Cassiae	Immediately brown, then olive-green, nearly black [illegible] two [illegible] green edge, [illegible] green changing to rose	S. Orange changing to olive-green Chl. Colorless	Unchanged Green	Dirty dark green	S. Red-brown Chl. Colorless	Dark-brown Light olive-green	Dirty olive-green Bluish
29	Ol. Zingiberis From Zeise	Light brown [illegible], dirty green edge	S. Blood-red Chl. Red [illegible]	Red-brown Brownish	Unchanged	S. Orange Chl. Colorless	Dark red-brown Light rose	Indefinite
30	Ol. Galangae From Zeise	Like 29, blue edge, indefinite	S. Dark brown Chl. Colorless	Unchanged Dark violet	Brown Deep violet-blue	S. Orange, then brown Chl. Colorless	Dark brown Dark violet	Indefinite
31	Ol. Cardamomi	Orange-brown changing to red-brown, nearly red, [illegible] orange-rose	S. Orange, becoming darker Chl. Colorless	Splendid red Light violet	Red-brown Indefinite	S. Yellow to orange Chl. Colorless	Dark orange Reddish violet	Dark orange Handsome blue-green
32	Ol. Piperis From Zeise	Like 31, [illegible] and dotted black, red [illegible] with black spots	S. Dark blood-red Chl. Colorless	Brown Violet	Brownish Blue-violet	S. Orange Chl. Colorless	Dark brown Light wine-red	Unchanged Handsome cherry-red
33	Ol. Cubebar.	Brown, reddish-violet edge, blue edge	S. Intense yellow Chl. Violet	Brown Handsome violet	Brown Handsome amethyst-violet	S. Orange Chl. Colorless	Dark red-brown Wine-red	Dark blood-red Red-brown, violet in thin layers
34	+ Ol. Copaivae aeth.	Light [illegible], green edge, rose edge, black streaks, red spots	S. Orange changing to rose Chl. Colorless	Brown Violet	Gray-brown Deep violet	S. Yellow Chl. Colorless	Handsome orange Nearly colorless	Indefinite
35	+ Ol. Bacc. Juniperi	Dark orange, blood-red with gray-blue spots	S. Yellow, in thin layers red Chl. Colorless	Brown Faint reddish-violet	Brown Dirty blue	S. Faint yellow Chl. Colorless	Like 34	Orange Yellowish
36	+ Ol. Bacc. Juniperi Resinified	Dark brown, dark with red edge	S. Chl.					
37	Ol. Ligni Juniperi	Like 36	S. Like 35 Chl. Violet	Black-brown Faint violet	Unchanged Dark violet	S. Orange, rapidly darkening Chl. Colorless	Dark brown Dirty Brown	Indefinite
38	Ol. Ligni Cedri	Dirty light brown, rapidly partly violet, partly blue edge, shaded lastingly blue	S. Splendid green changing to blue Chl. At first colorless, then blue	Olive green Handsome blue	Indefinite	S. Nearly colorless Chl. Colorless	Nearly colorless	Nearly colorless Faint rose
39	+ Ol. Sabinae	Light brown changing to deep blood-red, constant dark cherry-red	S. Red-brown Chl. Pale rose	Brownish Pale rose	Unchanged Colorless	S. Orange, changing to blood-red Chl. Colorless	Dark blood-red Light brown	Unchanged Red-brown
40	Ol. Pini Sylvestr.	Mahogany-brown, dark brown, and red edge [illegible] slowly [illegible]	S. Red-brown Chl. Colorless	Red-brown Faint violet	Unchanged Colorless	S. Orange Chl. Colorless	Red-brown Faint brownish	Red-brown Faint rose
41	Ol. Pini Pumil.	Like 40	S. Red-brown, changing to red-brown Chl. Colorless	Red-brown Dirty yellow	Indefinite	S. Orange, changing to red Chl. Colorless	Dark brown-red Light rose	Unchanged Reddish
42	Ol. Terebinthinae Gallic.	Dark [illegible] gray-brown, red edged, black with red [illegible]	S. Blood-red Chl. Colorless	Dark brown Indefinite	Unchanged	S. Chl. Like 41	Like 41	Like 41
43	Ol. Terebinth. rectif.	Like 42	S. Blood-red Chl. Colorless	Dark brown-red Gray-green	Unchanged Dark green	S. Yellow Chl. Colorless	Like 41	Like 41
44	Ol. [illegible]	Red-brown, like 42	S. Chl. Like 4?	Indefinite	Indefinite	S. Orange Chl. Colorless	Brown-red Brownish	Darker
45	Ol. Bergamottae	[illegible]-brown, dark brown with red streaks and spots	S. Red-brown Chl. Colorless	Dark brown Faint violet	Unchanged Olive-green	S. Faint yellow Chl. Colorless	Yellow-brown Light rose	Brown Indefinite
46	Ol. Aurant. Amar.	Dark [illegible], red edge	S. Light brown Chl. Colorless	Brown Yellow-brown	Indefinite	S. Yellow, changing to orange Chl. Colorless	Orange, reddish in thin layers Brownish	Indefinite
47	Ol. Aurant. Dulc. Resinified	Dark amber-[illegible], reddish streaks	S. Dark brown Chl. Colorless	Indefinite	Indefinite	S. Red-brown Chl. Colorless	Dark brown Light olive-green	Unchanged Indefinite

oils are with great difficulty or not at all soluble in petroleum ether. Arch. Ph., April, 1878, pp. 290–298.

Volatile Oils—Adulterations.—Leonhardi has had experience. in determining the quality of essential oils. The simplest method for detecting alcohol is that of adding a little anilin red, whereby, in the presence of alcohol, a red color is produced; this is preferable to the otherwise reliable method of shaking the suspected oil with water in a graduated tube, because it is not attended by appreciable loss in the case of expensive oils.

Oil of anise, the author finds, is now considerably adulterated with the stearoptene of oil of fennel, which is largely imported from Russia for this purpose. As much as 90 per cent. is sometimes added. It is detected by its peculiar odor on heating the suspected oil.

Oil of coriander is adulterated with colorless oil of orange. Pure oil of coriander is mixable in all proportions with 90 per cent. alcohol, while oil of orange is but sparingly dissolved; this serves as a means of detecting the latter.

Oil of bergamot is also adulterated with oil of orange; being readily soluble in 90 per cent. alcohol, the latter is detected by its difficult solubility.

Oil of caraway is often mixed with the oil of caraway chaff, and the latter again with oil of turpentine. The behavior to iodine, and also to 90 per cent. alcohol, which forms a clear solution with pure oil of caraway, while when it is mixed with oil of turpentine a turbid liquid is formed, as well as the odor, will detect the adulterant.

American oil of peppermint (evidently Hotchkiss's) from the description of the label, the author believes to be adulterated with oil of sassafras. It does not correspond to the character of pure English oil of peppermint. Arch. Ph., June, 1878, p. 490.

Volatile Oils—Simple Method for Determining the Presence of Alcohol.—A method for the detection of alcohol depending on the fact that concentrated glycerin does not combine with volatile oils, is given in "Polyt. Notizbl." Into a small cylinder, accurately graduated in cc., 6 cc. of pure conc. of glycerin, sp. gr. 1.25, are introduced, followed by 6 cc. of the volatile oil. The mixture is well shaken, and then allowed to stand at rest until the two layers have become perfectly clear. Any increase in the volume of glycerin indicates the quantity of alcohol that may be contained as adulterant of the volatile oil. Ph. Centralh., No. 21, 1878, p. 194.

F. H. Newman has contributed a paper on the means of detecting adulterations in volatile oils, which appear to be a compilation of the suggestions made from time to time, and may be useful for reference. The Pharm., July, 1877, p. 199.

Essential Oils—Examination with Special Reference to their Terpenes.—William A. Tilden has for some time past been engaged in experiments upon certain essential oils, in the hope of being able to throw some light upon the chemical constitution of the hydrocarbons of the terpene family, which, as is well known, exist in a great many of the volatile oils obtained from plants. In the course of these researches, however, he has naturally been led to examine, more or less closely, some of the other hydrocarbons and oxidized bodies which accompany the terpenes. The author draws attention to the fact that the name of terpene, must be carefully restricted to compounds of formula $C_{10}H_{16}$, and must not be extended to the polymeric hydrocarbons, $C_{15}H_{24}$ and $C_{20}H_{32}$, into which the terpenes are easily converted by heat or by the action of certain energetic chemical agents. By passing nitrosylchloride gas (NOCl) into the terpene, either pure or diluted with chloroform or alcohol, according to circumstances, and cooled to about —10° C. (= + 16° F.), a white crystalline body is deposited, which always has the formula $C_{10}H_{16}NOCl$; from this compound, by treatment with alcoholic potash, or by cautious heating, the elements of hydrochloric acid may be removed, and the substitution product, $C_{10}H_5$ (NO), obtained. These nitroso-compounds are easily obtainable in large crystals, and, by their crystalline form, melting-point, and optical characters, they serve to determine the character of the terpenes from which they have been derived. The reaction was first discovered by the author in 1875 (Jour. Chem. Soc., June, 1875), and is applied by him in the present investigations. As a result of his experiments with a number of volatile oils, he finds that the terpenes ($C_{10}H_{16}$) which are present in many of them, contribute less than any other constituent to the peculiar odor of the oil. The natural terpenes are colorless, limpid liquids, which vary in sp. gr. from about 0.84 to about 0.86. They are divisible into two groups as follows:

1. *Turpentine Group:* boiling-point, 156° to 160° C. (= 312.8°

to 320° F.); melting-point of nitroso-derivative, 129° C. (= 264.4° F.); forms solid crystalline hydrated terpin ($C_{10}H_{20}O_2,H_2O$).

2. *Orange Group:* boiling-point, 174° to 176° C. (= 345.2° to 348.8° F.); melting-point of nitroso-derivative, 71° C. (= 159.8° F.); forms (by Wiggers's process) no solid crystalline hydrated terpin.

The liquids included in each group are allotropic modifications of the same hydrocarbons, distinguished one from another by their various rotatory action on the polarized ray. It will, however, be found, the author believes, that the terpenes from several different plants will, on further examination, be conclusively proved to be really identical, and not simply isomeric.

The oils examined by the author were several: 1, oil of turpentine; 2, oil of juniper; 3, oil of sage; 4, oil of savin; 5, oil of lavender; 6, oil of caraway; 7, oil of orange; 8, oil of bergamot; and 9, oil of lemon. The first three oils contained terpenes represented by the first group; the last four belong to the second group; while neither oil of savin nor oil of lavender contain any terpene at all. Yearbook of Ph., 1877, p. 489–498.

Tereben—Preparation.—Tereben is now occasionally used in lieu of carbolic acid, thymol, and salicylic acid, as an application to wounds. It is obtained as follows: 1000 p. of oil of turpentine (French) are introduced into a retort surrounded by ice-cold water; 50 p. of conc. sulphuric acid are now introduced, drop by drop, through a narrow-necked funnel, and mixed with the oil by gentle agitation after each addition. The retort is then transferred to a sand- or oil-bath, and the mixture heated to a temperature not exceeding 210° C. (= 410° F.), as long as anything distils over. The distillate—which contains some undecomposed oil of turpentine—is again treated with $\frac{1}{20}$th of its weight of concentrated sulphuric acid, in the same manner, and this is repeated with the second distillate if it is desired to obtain perfectly pure tereben. For medicinal application the product of the second distillation is sufficiently pure. Tereben is a colorless transparent fluid, having the odor of thyme, a sp. gr. of 0.860, and boiling at 156° C. (= 312.8° F.). It is distinguished from terebenthen in its indifference to polarized light. Ph. Centr. H., Nov. 8th, 1877, p. 369.

Turpentine Oils.—Dr. Godeffroy gives the following characteristics of the various oils of turpentine found in the European market:

Austrian oil of turpentine, from Pinus Austriaca: transparent, colorless, or slightly yellowish; sp. gr. .864; boiling-point, 155°–157° C. (= 311°–314° F.); turns polarized light to the left.

German oil of turpentine, from Pinus sylvestris, P. abies, P. vulgaris, P. picea, and P. rotundata, resembles the former; sp. gr., .860–.870; boiling-point, 155°–160° C. (= 311°–320° F.); lævogyre.

French oil of turpentine, from Pinus maritima: colorless or faint yellowish; sp. gr., .860; boiling-point, 156°–157° C. (= 312.8°–314.6° F.); lævogyre; odor, peculiar; taste, burning. French turpentine is chiefly produced in the neighborhood of Bordeaux, and yields 25 per cent of oil.

Venitian oil of turpentine, from Venice turpentine of Larix decidua, is lævogyre, and resembles the preceding, but has a more agreeable odor. Venice turpentine is mostly obtained in Southern Tyrol and in Piedmont, and yields 18–25 per cent. of oil.

English oil of turpentine, from American turpentine of Pinus palustris and P. tæda, resembles the French; has the sp. gr. .864; boils at 156°–157° C. (= 312.8°–314.6° F.), and is dextrogyre. American turpentine yields about 17 per cent. of oil.

Besides these principal varieties, the following are likewise met with:

Pine cone oil, oleum abietis pini, is obtained by distilling with water the cones of Abies pectinata. It has a much finer odor than oil of turpentine; sp. gr., .868; boiling-point, 160°–162° C. (= 220°–323.6° F.), and is dextrogyre.

Dwarf pine oil (Krummholz- or Latschenœl, Germ.), oleum pini pumilionis, is obtained by distilling the young tops and cones of Pinus pumilio with water. It has a peculiar odor, reminding of juniper; sp. gr., .865; boiling-point, 170° C. (= 338° F.), and is lævogyre.

Pine leaf oil is obtained by distilling the leaves of Pinus sylvestris or P. abies by means of steam. It has a fine aromatic odor; sp. gr., .876; boiling-point, 160° C. (= 320° F.), and is dextrogyre.

Templin oil (Kienœl, Germ.), is obtained chiefly in some sections of Switzerland and Tyrol by distilling the wood, branches, leaves, cones, etc., with water. It has a lemon-like odor; sp. gr.

.860–.880; boiling-point, 160°–164° C. (= 320°–327.2° F.), and is lævogyre. A. J. Ph., Feb. 1878, p. 68; from Pharm. Zeit., 1877.

Russian Oil of Turpentine.—W. A. Tilden has lately had opportunity to examine a specimen of Russian oil of turpentine, and he finds it to differ very materially from American as well as from French oil. The crude oil possesses an odor which is quite distinct from ordinary turpentine oils, and is strongly suggestive of "pitch-pine" wood and sawdust. Its sp. gr. at 15° C. (= 59° F.), is 0.8682, and it is right rotary. It contains both acetic acid and empyreumatic products, which may be removed by shaking with solution of soda, separation of the oily liquid, and redistillation, preferably in a current of steam, and is evidently a product obtained in the distillation of tar from the wood of various Coniferæ. Subjected to careful fractional distillation, after shaking with solution of soda, it yielded:

a. A liquid having the same composition and nearly the same properties as common turpentine oil, but having a stronger action on polarized light.

b. A liquid having the same composition as turpentine oil, but boiling at 171.5° C. (= 340.7° F.), or thereabouts.

c. High boiling hydrocarbon, polymeric with turpentine oil; a small quantity only.

The agreeable odor of the rectified oil, as compared to that of common turpentine, seems to render it a suitable substitute for those in pharmacy, and Mr. A. W. Postans, after inquiring into the therapeutic uses to which oil of turpentine is applied, recommends it as such. Preparations made from it are free from the paint-like odor of those made with ordinary turpentine oil, and are even agreeable. Besides the officinal preparations in which it may be used, he recommends it for internal administration in the form of the following emulsion:

℞. Russian turpentine (Oil ? Rep.), ʒij; mucil. tragacanth, ʒiv; pulv. amygdalæ co., ʒiv; aq. chloroform, ad ℥vj. Misce secundum artem.

According to Hanbury and Flückiger it is the *Pinus sylvestris*, or so-called Scotch pine, which is chiefly employed in the north of Europe for the purpose of producing the empyreumatic products above referred to, and it seems, therefore, the probable source of the Russian turpentine oil. The opportunity to examine some oil distilled from the leaves of *Pinus sylvestris* was, therefore, very welcome to Mr. Tilden. The examination of this oil is not quite finished, but the few facts established prove that the chief constituents are not the same in the two oils.

Ol. Fol. Pini Sylvestris, as received by the author, has a sp. gr. = 0.8756 at 12° C. (= 53.6° F.). It is dextro rotatory. After careful fractioning two chief products were obtained:

a. Boiling at 156°–159° C. (= 312.8°–318° F.); dextro rotatory. Almost certainly identical with common turpentine.

b. Boiling at 171°–176° C. (=339.8°–348.8° F.); lævo rotatory; odor the same as the chief terpene from Russian turpentine oil, and probably identical in composition. Ph. J. Trans., Dec. 8th, 1877, pp. 447–448.

Oil of Turpentine—Decomposition at a High Temperature.—G. Schultz obtained, by passing the vapor of oil of turpentine through an iron tube heated to dull redness, a tarry distillate, in which he found the following substances: Benzine, toluene, xylene, unaltered oil of turpentine, naphthalene, phenanthrene, anthracene, and methyl anthracene. Carbon was deposited in the tube, and a large quantity of combustible gases, which were not examined, were produced. J. Chem. Soc., Sept. 1877, p. 341; from Ber. d. Deut. Ch. Ges.

Oil of Citrus Limetta.—C. H. Piesse and C. R. Alder Wright have subjected the oil of limes to a nearer examination. The oil is obtained in the same way as the kindred oils of orange and lemon, viz., by rasping the unripe fruit on a concave metal rasp fixed over a basin, expressing the pulp, separating the oil, purifying by filtration, etc. So obtained it has the fine odor of the fruit, and is superior to that obtained by distillation of the residue of expression. The sp. gr. at 15.5° C. (= 59.9° F.). is 0.90516. When subjected to distillation the oil begins to distil at 181° C. (= 357.8° F.), and 70 per cent. of it passes over between that temperature and 186° C. (= 366.8° F.). Above the latter temperature and to 250° C. (= 492° F.), very little oil passes over, and the residue in the still is found to be a dark-brown gluey mass, having, when cold, an almost solid, resinous consistence. On long standing a crystalline body separated from this, which, when purified by suitable means, proved to have the composition $C_{24}H_{28}O_5$. It yielded no protocatechuic acid, and is not the hesperidin of Ed. Hoffmann. It forms nearly white micaceous crystals, inodorous, perfectly neutral, insoluble in water, soluble in caustic potash, with a lemon-yellow color, readily soluble in boiling alcohol, sparingly in cold.

The distillate below 186° C. (= 366.8° F.) was faintly yellow. About 99 per cent. of this distilled over almost constantly at 176° C. (= 348.8° F.), a little of a colorless fluid, exhibiting no constant boiling-point, distilling between 180° and 230° C. (= 356° and 446° F.), and only a minute quantity of resinous matter being left in the distilling vessel. The composition of the main portion of the distillate was that of a terpene, $C_{10}H_{16}$. It was by appropriate means caused to yield *cymene*, identical with ordinary cymene, and consequently also with that previously obtained by them from the terpene of oil of orange, boiling at 178° C. (= 351.4° F.). J. Chem. Soc., Nov. 1878, p. 548.

Oil of Thymus Serpyllum.—E. Buri, by fractioning this volatile oil, which was golden yellow, neutral, and left-rotating, obtained, besides some acetic acid and a small proportion of a fatty acid (not butyric) of the higher series, a liquid phenol, possessing some resemblance to *thymol*, but distinguished from the latter in the following:

1. The solution in diluted alcohol is colored yellow-green by ferric chloride—thymol produces no sensible change.

2. The phenol from the serpyllum oil does not congeal at 10° C. (= +50° F.). Thymol may remain liquid at moderate temperature, but at 0° C. (= +32° F.) is quite certain to congeal.

3. The potassium salt of the sulfonic acid of the serpyllum-phenol is amorphous. The potassium salt of thymol-sulfonic acids are readily crystallized. Arch. Ph., June, 1878, p. 485.

In this connection Prof. Flückiger enumerates the plants, whose volatile oils have been so far ascertained to contain thymol: *Thymus vulgaris*, L. (Caspar Neumann, of Berlin, in 1735, described "Camphora Thymi"); *Monarda didyma*, L. (Brunn, of Güstrow, described a crystalline deposit in 1796); *Monarda punctata*, L. (Arppe in 1846); *Ammi copticum*, L. (*Phychotis ajowan*, D. C., and *Phychotis coptica*, D. C., Stenhouse, 1855, Haines, 1856, and Hugo Müller, in 1869). Doveri, of Florence, investigated the character of the crystalline component of oil of thyme in 1847, and Lallemand, in 1853, subjected it to further examination and named it thymol. Ibid., p. 488.

Commercial Oil Thyme (so-called Origanum).—A. W. Gerrard has endeavored to prepare thymol from various specimens of commercial oil of thyme, but failed to obtain that product from any of them after proper treatment (see Thymol). After having failed in the first instance he had purchased eight more samples, from the *huile rouge de thyme* (red oil of thyme), and four of the *huile blanche de thyme* (white oil of thyme); from one of these, it is true, he separated by treatment with caustic soda, and neutralization of the alkaline solution with hydrochloric acid, about 12 per cent. of oily matter, but this, on examination, differed to such an extent in color, odor, and look from thymol, that he cannot pronounce it as such. Subjection to refrigeration by surrounding the samples with loose ice for three days also failed to effect the separation of a trace of crystalline or other matter. The results, of a negative character, show that the oil of thyme of English commerce contains no thymol, and the author infers from this circumstance that the thymol must be extracted from the commercial oil in the countries of its production, the residual cymene or thymene being sold as oil of thyme. Ph. J. Trans., Feb. 16th, 1878, p. 646.

Oil of Origanum.—J. W. Ballard has recently examined a sample of very light-colored oil of origanum, sold for pure oil and liberally paid for, which, on examination proved to be a mixture of alcohol and pure oil—the alcohol constituting about three-fourths of the whole. A. J. Ph., Dec. 1877, p. 588.

Thymol.—A. W. Gerrard has made a number of experiments which have developed a few novel facts concerning it, of a character likely to prove useful to pharmacists. The author also gives a concise review of its source, preparation, and prominent characters. Thymol is a homologue of the phenol series, represented by the formula $C_{10}H_{14}O$ (O=16). Several plants of the order Labiatæ are known to yield it, the principal of which are *Thymus vulgaris* and *Monarda punctata;* it is also obtainable from an East Indian umbelliferous plant, *Phychotis ajowan.* From the essential oils of these plants the thymol is finally extracted, the separation being effected either by treating the oil with an equal volume of solution of caustic soda (1 in 5), separating the aqueous layer, decomposing the thymate of sodium by means of hydrochloric acid, removing the thymol which rises to the surface, and further purifying by distillation with water, and by this process it is said to be incapable of crystallization; or, better, by subjecting the oil of thyme to a low temperature, when thymol crystallizes out. Flückiger and Hanbury made thymol by subjecting *oil of ajowan* to a temperature of 0° C. (= 32° F.), and obtained 35 per cent. in superb tubular crystals. Oil of thyme is stated to contain 50 per cent.

The author found commercial thymol to consist of irregular broken crystals, nearly transparent and colorless; the taste burning and aromatic; the sp. gr. 1.028, but lighter than water when fused; its melting-point about 44° C (= 111.2° F.), and when completely fused to remain liquid at the ordinary temperature for several days, but the contact of a crystal will at once cause it to crystallize. It is freely soluble in alcohol, ether, chloroform, benzol, bisulphide of carbon, fats, and oils. Rectified spirit dissolves its own weight, but on addition of water most of the thymol is separated; the strongest spirituous solution that is miscible with water in any proportion without turbidity is 4 grs. in the fluid ounce. Cold water dissolves but 1 part in 1200, but with hot water 1 in 1000 can be dissolved; a solution of 1 in 900 which the author prepared with hot water remained clear for 24 hours, and then began to deposit crystalline needles, mingled with prismatic plates, throwing off beautiful colored reflections. The power of glycerin to dissolve thymol is not great; by the aid of heat 1 grain was dissolved in two fluid drachms of glycerin, and on cooling deposited no crystals, and this solution can be diluted in that producing turbidity until 4 volumes of water have been added. Fats and oils are excellent solvents, but require to be heated with the drug to insure perfect solution and diffusion, and unless particular attention be paid to this, much irritation may be caused a patient by minute undissolved particles of thymol being present in an ointment. In making ointments, therefore, the author prefers to dissolve the thymol in a few drops of alcohol, and then to mix the basis. The caustic alkalies, potash and soda, dissolve thymol readily; 3 grains are dissolved by 1 grain of caustic soda; 2½ grains by 1 grain of potassa, and the solution may be diluted with water to any degree desired; ammonia dissolves it but sparingly. The reputed high antiseptic power of thymol appears likely to call thymol into more general use. Bucholz has published the following table of comparative value of antiseptics, giving to thymol ten times the power of carbolic acid:

Name of Antiseptic.	Colytic.	Destructive.
Chlorine, ...	——	2.5
Thymol, ...	200.0	20.0
Sulphurous anhydride, ...	——	66.0
Salicylic acid, ...	66.0	31.0
Carbolic acid, ...	20.0	25.0
Alcohol, ...	5.0	0.5

Mr. Gerrard concludes his paper by saying that all experimenters with thymol, as far as he is acquainted, are unanimous in their opinion of its high value, giving it a position above any other body of its class we have at our command. Its pleasant odor and non-poisonous property are also very important features. Ph. J. Trans., Feb. 16th, 1878, p. 645.

Thymol.—Experiments made with vegetable infusions of various kinds, such as hay, colomba, gentian, etc., by W. Willmott, show thymol to be, as has been shown by others, an excellent anti-ferment, and preferable to carbolic acid, on account of its non-irritant character. Whether it will be found available, however, for its antiseptic treatment of wounds, must be shown by experience. Very good results have so far been obtained with it in that direction in Germany. Regarding its solubility, the author remarks that he has found chloral hydrate to promote it very materially. It is freely dissolved in strong solutions of the latter if the proportion reaches 1 thymol to 12 of the solid hydrate. Such strong solution (about 20 grs. to the oz.), when diluted with water will, however, retain only 1 p. thymol in 600. Ph. J. Trans., March, 1878, p. 706.

Oil of Peppermint—Action of Chloral Hydrate.—Several years ago Dr. C. Jehn (see Proceedings, 1874, p. 232), had drawn attention to a red coloration produced by chloral hydrate on oil of peppermint. This reaction was subsequently drawn into controversy, and Dr. Jehn, in a subsequent rejoinder (see Proceedings, 1875, p. 326), maintained his former position, and added, "that it is particularly French oil of peppermint that produces the reaction claimed." Dr. M. Dunnin has now repeated the experiments of Dr. Jehn, and, operating with seven samples of oil of peppermint, and with perfectly pure and *neutral* chloral hydrate, he obtained negative reactions. Quite different results were, however, obtained, when a *slightly acid* chloral was used. With such chloral he obtained color reactions which, according to the oil used, varied between various shades of brown, reddish brown, rose red, red, and reddish violet, the colors changing more or less on standing or when heated. Among the oils used were samples of French, German, English, and American. Arch. Ph., Dec. 1877, p. 510–512.

Metanethol Camphor.—The exact relationship between the four isomeric bodies—*anethol*, *metanethol*, *anisoïn*, and *metanethol cam-*

phor—is still a question of much uncertainty. With a view to throwing additional light on the subject, O. Perrenoud has studied metanethol camphor. It was prepared by heating fused anethol with three and a half times its weight of powdered chloride of zinc, and distilling in a current of steam. Metanethol camphor forms, when pure, long glittering needles, melting at 132° C. (= 269.6° F.), and boiling above 300° C. (= 562° F.), whilst partially subliming at a lower temperature. It is easily soluble in boiling acetic acid, not so easily in hot ether and alcohol, readily in chloroform, bisulphide of carbon, benzene, and concentrated sulphuric acid, and slightly soluble in cold ether and alcohol. It is insoluble in water and in solution of soda. It is readily acted on by nitric acid, forming substitution compounds, which are being further examined. On analysis metanethol camphor yields numbers closely agreeing with the formula $C_{10}H_{12}O$ (0 = 16). The view taken by Gerhardt that anethol and metanethol camphor are isomeric, is therefore fully confirmed. With concentrated sulphuric acid, metanethol camphor forms a sulpho-acid, $C_{10}H_{11}(SO_3)OH$ (O = 16), the calcium salt of which forms large plates and is readily soluble in water and alcohol; the barium salt forms long glittering needles, united in groups, and is sparingly soluble in alcohol, more soluble in dilute alcohol, and readily in water. Each molecule of this salt contains 1 mol. of water. The sodium salt forms needle-like crystals. A crystalline chlorinated substitution compound is also described. J. Chem. Soc., Oct. 1877, p. 480; from Liebig's Annales.

Cuminol.—The statement of Kraut that cymene is formed by the action of potash on cuminol, being inconsistent with views now generally accepted regarding the nature of cymene, Richard Meyer has repeated Kraut's experiments, and finds that pure cuminol, when boiled with alcoholic potash, or when digested therewith in the cold, yields cuminic acid and cuminic alcohol, but no cymene. The cymene found by Kraut probably existed as such in the cuminol employed by him. The numerous investigations of cymene made of late years leave little doubt as to the identity of the various hydrocarbons of the formula $C_{10}H_{14}$ (O = 16), to which the name has been applied, and the author concludes that we know as yet only one cymene—paramethyl-propyl-benzene. J. Chem. Soc., Sept. 1877, p. 335.

Borneo Camphor.—J. Kachler is engaged with a comparative examination of the natural Borneo camphor of *Dryobalanops* *camphora*, and of the borneol obtained by Bauligny's method from the camphor of the *Laurineæ.* He finds that both borneols yield with pentachloride of phosphorus or with strong hydrochloric acid identical chlorides, $C_{10}H_{17}Cl$, which melt at 147° to 148° C. (= 296.6° to 298.4° F.). This chloride is readily decomposed if heated in tubes to 100° C. (= 212° F.) along with water, yielding hydrochloric acid and a solid camphine, $C_{10}H_{16}$, which melts at 51° to 52° C. (= 123.8° to 125.6° F.), and boils at about 160° C. (= 320° F.). Ch. News, June 28th, 1878; from Ber. d. D. Ch. Ges. No. 4, 1878.

Monobromated Camphor—Dispensing.—Patrouillard Lepage takes advantage of the solubility of monobromated camphor in fixed oils for its medicinal exhibition. He finds oil of sweet almonds most suitable for this purpose, which, by the aid of gentle heat, will readily dissolve one-sixth its weight of the monobromated camphor. Seven grams of this oily solution, containing one gram of the active substance, are emulsified by the aid of 3 grams of powdered gum arabic, suspended in double its weight of water, and the necessary quantity of syrup or water is then added in the usual manner. Ph. J. Trans., Sept. 1st, 1877, p. 162.

Oil of Sage.—M. M. Pattison Muir has subjected a sample of oil of sage to chemical investigation, with a view to determining, if possible, the constitution of this complex oil. The oil upon which he operated was obtained from Messrs. Wright, Layman & Umney, of Southwark Street, London, and *was believed* by them to be a genuine sample. It is unfortunate that no positive knowledge of the source, as well as of the age, of the oil was had, since the author's paper evidences a very comprehensive examination of this particular sample of oil of sage.

The oil was of a yellow-brown color, without any shade of green; its smell was intensely sage-like; the taste hot and burning; the reaction was neutral. Its sp. gr., at 14° C. (= 57.2° F.), was determined to be 0.9339. The author describes its behavior to acids, exposure to air, etc., and the action of oxidizing agents, etc., on the constituents into which it is separable by fractional distillation. These are:

(1.) A liquid boiling at 156°–158° C. (= 312.8°–316.4° F.).

(2.) A liquid boiling at 166°–168° C. (= 330.8°–334.4° F.).

(3.) A liquid boiling at 198°–203° C. (= 388.4°–397.4° F.).

(4.) A solid deposited chiefly from those fractions of oil boiling from 190°–220° C. (= 374°–328° F); and perhaps, (5.) A heavy fluorescent liquid boiling at about 240°C. (= 464° F.).

Number (1) and (2) are doubtless terpenes; (1) contains, and yielded to the author about 7 per cent. of cymene; (2) yielded on oxidation a considerably larger quantity of terephthalic acid than did (1). (3) and (4) are oxygenated constituents of the oil; (3) was obtained only in small quantities, but the author has little doubt that it represents the liquid oxidized constituent of the oil, and he proposes for it the name of *salviol;* (4), when purified by suitable means, is a stearoptene (sage-camphor), and resembles ordinary camphor, both in appearance, smell, and taste; it has, however, a peculiar sage-like odor; by sublimation it is obtained in exceedingly beautiful crystals, which melt at 187° C. (= 368.6° F.), and resolidify at 177° C. (= 350° F.). The author promises to continue his researches, more particularly on the physical properties of the constituents of the oil. Yearbook of Ph., 1876, p. 560.

Further investigation, by the same author, of a purely chemical nature, are reported in the Yearbook for 1877, p. 498–507.

Oil of Geranium.—Prof. Dragendorff, in 1876, described a number of reactions, by which the more important essential oils could be recognized and distinguished from each other. Part of the oils used for his experiments were prepared in his own laboratory, but some of them were obtained from commercial sources. Among the latter, for the purity of which the author could get no guarantee, there were a French and a Turkish geranium oil. Recently Mr. H. W. Langbeck, of London, drew the author's attention to the fact, that a good, freshly-rectified, reputed geranium oil, derived from a species of *Andropogon,* does not correspond in its reactions either with the Turkish or the French oil, and the examination of a sample of the oil, rectified by Mr. Langbeck, fully confirms this.

The oil of Mr. Langbeck is perfectly colorless, and has an agreeable geranium odor; it decolorizes bromo-chloroform, and does not acquire with it any color, even after standing some time. With chloral it forms an almost colorless mixture. In alcoholic hydrochloric acid it dissolves equally colorless, but beomes very slowly reddish, and subsequently of a turbid red-brown color. The oil is dissolved by concentrated sulphuric acid with a dark gamboge color, but with it as well as with Fröhde's reagent, it soon assumes a brown color. A mixture of alcoholic hydrochloric acid and chloral forms with it, as pointed out to the author by Mr. Langbeck, a rose-colored coloration. Ph. J. Trans., Jan. 19th, 1878, p. 564.

Oil of Rose Geranium.—According to Jaillard, the oil of rose geranium—*Pelargonium rosatum*—is freely soluble in 70 per cent. alcohol. Since the fixed and most volatile oils which may be used for adultration are sparingly soluble in that liquid, they may be detected by mixing in a test-tube, six drops of the suspected oil with five cc. of 70 per cent. alcohol. After agitation the solution must be complete. A. J. Ph., May, 1878, p. 260; from J. de Ph. et de Chim., 1878.

Oil of Tansy.—According to Bruylants, oil of tansy consists of a small quantity (about 1 per cent.) of hydrocarbon, $C_{10}H_{16}$, four-fifths of an aldehyde, *tanacetyl hydride*, $C_{10}H_{16}O$, and of an alcohol, $C_{10}H_{18}O$. The aldehyde is best separated by bisulphite of sodium. Two resins were also found, one of which had the behavior of an acid. A. J. Ph., May, 1878, p. 254; from J. Ph. et de Chim., Nov. 1877.

Oil of Santal.—Owing to the many adulterations of this oil, Durand draws attention to a few previously published tests. 1. Prepare a fresh ammonio-copper solution, by saturating water of ammonia with black oxide of copper, and filtering. Then mix 20 grams of the filtrate with 80 grams of water. Place 10 grams of this solution into a test-tube (1 cm. wide) and add 2 grams of the oil. Shake forcibly. After twenty-four hours, the contents of the tube will have formed a white and opaque soap. If the oil of santal contains any oil of cedar, even as little as 1-10th per cent., the soap has a more or less green tint. 2. A mixture of 6 grams bromine, 20 grams 90 per cent. alcohol, and 64 grams water, produces different reactions with the oil of cedar, copaiva, and santal. The reaction is made with 1 gram of the oil and 15 grams of the solution. The precipitate formed with oil of santal looks like liquid honey; that with oil of cedar like tar; and that with oil of copaiva is olive green. By practice, a mixture of these oils may be recognized to a fraction of one per cent. New Rem., June, 1878, p. 175; from La Ruche Pharm., No. 4, 1878.

Oil of Angustura bark was obtained by Oberlin and Schlagdenhauffen to the amount of 1.9 per cent. It possesses the spec. grav. 0.934, boils at 267° C. (= 512.6° F.), and turned polarized light + 5.4°. Iodine turns the warm oil to a green mass, gradually becoming thicker. Bromine changes to blue, purple, and brown, leaving in the cold a hard, friable mass. Chlorine thickens the oil; potassium has little action; nitric acid colors gradually yellow and rose-red; chromic acid, with some ether and alcohol, produces a beautiful red color; iodic acid and alcohol rose-red, then orange; ferric chloride and ether carmine red, the coloration disappearing by more ether. A. J. Ph., Dec. 1877, p. 599; from J. de Ph. et de Chim., 1877.

Oil of Roman Chamomile—Acid Components.—By former experiments, Fittig and Kopf had found angelic and tiglic acids—both of which are handsomely crystallizable—to be components of the oil of Roman chamomile. Fittig and Köbig have now determined that isobutyric and methacrylic acids are also components of the oil. The presence of other acids could not be detected. Demarçay had in a former essay communicated the observation that angelic acid is changed, by the action of heat, or conc. sulphuric acid, into the isomeric tiglic acid, and had concluded that oil of Roman chamomile contained only angelic acid, which, during fractional distillation, was converted partially into tiglic acid. While the authors have found angelic acid to undergo such changes, their experiments seem, nevertheless, to prove the presence of tiglic acid in oil of Roman chamomile as a normal constituent. Ph. Centr. H., Aug. 9th, 1877, p. 261.

Resins, Gum-resins, and Balsams—Contributions to their Chemistry and Scheme for the Recognition of the most Important.—E. Hirschsohn, by his inaugural dissertation, has contributed a very thorough and comprehensive work on the chemistry of the most important resins, gum-resins and balsams. The author's dissertation is published complete in "Pharm. Zeitschr. f. Russland," but it has been extracted with more or less completeness in various pharmaceutic journals. The following, being the most suitable condensation of the paper, is a free translation from "Schweiz. Wochenschr. f. Pharm." (Oct. 12th, 19th, and 26th, 1877):

a. ENUMERATION OF THE REAGENTS, AND DESCRIPTION OF THE MANIPULATIONS.

The author aimed to determine reagents which should act upon the largest possible number of resins, etc., in the most characteristic manner; likewise, to adopt manipulations by which the nature of a majority of the bodies examined can be approximately judged.

The reagents employed were the following:

1. *Conc. sulphuric acid* of sp. gr. 1.8200.

2. *Alcoholic muriatic acid*, obtained by saturating 95 per cent. alcohol with dried hydrochloric acid gas.

3. *Solution of Bromine.*—Of the same strength as that used by Prof. Dragendorff for his experiments upon volatile oils (1 part bromine in 20 parts chloroform).

4. *Solution of chlorinated lime*, a saturated solution of chlorinated lime in distilled water at the ordinary temperature.

5. *Alcoholic Solution of Ferric Chloride.*—1 part crystallized ferric chloride in 10 parts 95 per cent. alcohol.

6. *Alcoholic Solution of Acetate of Lead.*—A saturated solution of neutral acetate of lead in 95 per cent. alcohol.

7. *Ammonia water* of sp. gr. 0.9800.

8. *Solution of Carbonate of Sodium.*—A solution of pure crystallized carbonate of sodium in water, saturated at 17° C. (= 62.6° F.).

9. *Fröhde's Reagent.*—1 ctgram. molybdate of sodium to 1 cc. sulphuric acid.

10. *Impure Chloral Hydrate*—(" *Chloral reagent* ").—A preparation which gives constantly the same reactions is obtained, according to the author's experiments, as follows: Dry chlorine is passed into absolute alcohol until it is no longer absorbed; the alcohol being first cooled, but afterwards heated to 100° C. (= 212° F.) to insure a more complete substitution. The syrupy liquid, upon cooling, is shaken with 4 times its weight of conc. sulphuric acid and allowed to stand. After twice twenty-four hours the solid metachloral, which has separated, is triturated with $\frac{1}{3}$ its weight of distilled water and subjected to distillation. The distillate forms a syrupy colorless liquid, which is not dissolved by water until after standing some time, and thus forms the reagent. All experiments, made with the most variable proportions of pure chloral and chloral hydrate with conc. sulphuric, muriatic, nitric, or chloracetic acids, produced different reactions from the above reagent.

11. *Solution of Iodine.*—A saturated solution of iodine in petroleum ether boiling at 60° C. (= 140° F.).

The solvents employed, were the following:

1. *Alcohol* of 95 per cent. Tralles.

2. *Ether.*

3. *Chloroform.*—This must be free from alcohol, because in its presence some resins, such as copal, exhibit a different behavior.

4. *Ether-Alcohol.*—A mixture of equal volumes of 95 per cent. alcohol and ether.

5. *Petroleum Ether.* The experiments were made with those portions that boil between 25°–40° C. (= 77°–104° F.).

In order to secure as complete extraction as possible, the very finely powdered resins, gum-resins, or balsams, were mixed with sand or powdered glass, and treated with petroleum ether as long as anything was thereby dissolved. From these extractions the petroleum ether was at first evaporated spontaneously in air, and finally over caustic lime at the ordinary temperature, and the residue weighed; the weighing being repeated every quarter hour until two successive weighings showed no further loss, or a loss only in the 4th decimal. To determine the volatile components, the residues were now heated to 120° C. (= 248° F.) and maintained at this temperature until no further loss occurred, an operation usually requiring two hours.

.The gum-resins were with few exceptions used for the quantitative experiments with the above-mentioned reagents, in the form of fine powder from selected pieces, and that in the following manner:

0.2 gram of the substance was placed in a test-tube, 2 cc. of *sulphuric acid* added, shaken, allowed to stand a few minutes and the resulting appearance observed.

One half of the solution in sulphuric acid was then mixed with ten times its volume of distilled water and the other half with three times its volume of 95 per cent. alcohol.

For the experiments with *alcoholic hydrochloric acid* the same quantities were used as in the above-mentioned experiment.

The experiments with *solution of chlorinated lime* were made by pouring the solution upon small pieces of the substance.

For the solubility experiments with *chloroform* 0.1 gram of the substance was used to 1 cc. of chloroform. If complete solution was not effected 1 to 2 cc. more was added.

Three chloroformic solutions or extractions were used for the experiments with *solution of bromine*, 5 drops of the latter being added to the solution (1.10).

The experiments with *alcohol* were also made in the manner just mentioned, 0.5 gram of the resin or gum-resin was shaken with 5 cc. alcohol, and, if complete solution was not effected thereby, heated to boiling. If this also failed to effect solution, larger quantities of alcohol were used. The alcoholic solution was filtered from undissolved matter, and divided into three portions. The first was treated with a few drops of solution of acetate of lead, and, finally, with an equal volume. The second portion was treated with a few drops of *solution of ferric chloride*, and the third portion with an equal volume of *ammonia water.*

The experiments with *ether* and with *ether-alcohol* were made in the same proportions.

The solutions in ether were besides treated with an equal volume of 95 per cent. alcohol, and it was observed whether any precipitation was thereby produced.

Solution of carbonate of sodium was caused to react upon the substance both at the ordinary and at a boiling temperature, the proportions being the same as in the above experiments. The solutions obtained by either method were filtered and treated with *acetic acid* in excess, and note taken of any precipitate formed.

The experiments with *solution of iodine* were made by adding a few drops of the intensely violet-colored solution, the solution of the resin, etc., in petroleum, and any decoloration or change in color of the iodine solution noted.

The chloral reagent, *pure sulphuric acid* and *Fröhde's reagent* were used, by adding a few drops of the reagent by means of a glass rod on the residue of evaporation of the petroleum extraction.

Besides the above-mentioned experiments the author also made some tests for *nitrogen*, *sulphur*, *cinnamic* acid, and—among the products of dry distillation—for *umbelliferon.*

The test for *sulphur* was made according to the method first recommended by Prof. Vohl (Zeitschr. Analyt. Chem., 1863, vol. 2, p. 452), by melting the resin or gum-resin with a piece of metallic sodium of equal size, and extracting the resulting mass with distilled water. The filtrate was divided into two portions, the one being tested for sulphur, the other for nitrogen; to the portion for detecting sulphur a few drops of a recently prepared solution of nitroprusside of sodium (1: 60) was added. The second portion, for the determination of *nitrogen*, was mixed with a few drops of solution of ferrous sulphate and then treated with hydrochloric acid in excess.

The determination of *umbelliferon* among the products of dry distillation was made by placing small quantities (0.5 to 1.0 gram) of the substance in a test-tube, and heating until the bottom of the tube became red hot. After cooling, the residue of the heating and the tarry product on the sides of the glass are boiled with water and the solution filtered, when, in the presence of umbelliferon, the hot liquid will show handsome blue fluorescence and become turbid on cooling. This turbidity disappears upon the addition of a few drops of solution of soda or potassa, and the liquid assumes a more intense fluorescence.

Finally, the determination of *cinnamic acid* was made by boiling the powdered resin or gum-resin with solution of carbonate of sodium and treating the boiling liquid with a solution of permanganate of potassium, when, in presence of cinnamic acid, a distinct odor of oil of bitter almonds is dissolved.

b. REVIEW OF THE RELATION OF THE GUM-RESINS, RESINS AND BALSAMS, EXAMINED BY THE AUTHOR, TO REAGENTS.

Alcohol dissolves completely:

Benzoin, Caranna, Coniferæ Resins and Balsams, Dragon's Blood, Guaiacum Resin, Peruvian Guaiacum Resin, Mani Resin, Mastiche from Alexandria, Mastiche from Bombay, black Peruvian Balsam, Podocarpus Resin, Sandarach, Tolu Balsam, Xanthorrhœa Resins.

Alcohol dissolves incompletely:

Ammoniac, Assafœtida, Bdellium, Canada Balsam, Ceradia Resin, Copaiva, Copal, Dammar, Elemi, Euphorbium, resin of Euphorbia Tirocalli, Euryops Resin, Galbanum, Gutti (Gamboge ? Rep.), Gumlac, Liquidambar Balsam, common Mastiche, Mecca Balsam, Myrrh, Olibanum, Opoponax, white Peruvian Balsam, Sagapenum, Sonora Lac, liquid Storax.

Ether dissolves completely:

Caranna, Canada Balsam, Coniferæ Resins and Balsams, Copaiva, Dragon's Blood, Elemi, Guaiacum Resin, Peruvian Guaiacum, Mani Resin, Mastiche, Podocarpus Resin, Sandarach.

Ether dissolves incompletely:

Ammoniac, Assafœtida, Bdellium, Benzoin, Ceradia Resin, Copal, Dammar, Euphorbium, resin of Euphorbia Tirocalli, Galbanum, Gumlac, Gutti, Liquidambar Balsam, Mecca Balsam, Myrrh, Olibanum, Opoponax, black Peruvian Balsam, white Peruvian

Balsam, Sagapenum, Sonora Lac, liquid Storax, Tolu Balsam, Xanthorrhœa Resins.

The ethereal solution becomes turbid on addition of alcohol:

Canada Balsam, Brazilian Copal, Copaiva from Maranham and Para, Dammar, resin of Euphorbia Tirocalli, Euryops Resin, Liquidambar Balsam, Mastiche (common), white Peruvian Balsam, Sonora Lac, liquid Storax.

The ethereal solution furnishes with alcohol a clear mixture:

Ammoniac, Assafœtida, Bdellium, Benzoin, Caranna, Ceradia resin, Coniferæ Resins and Balsams, Copaiva from Brazil, Copal, Dragon's Blood, Elemi, Euphorbium, Guaiacum Resin, Peruvian Guaiacum Resin, Galbanum, Gutti, Gumlac, Balsam of Liquidambar Styraciflua, Mani Resin, Mastiche from Bombay, Mastiche from Alexandria, Mecca Balsam, Myrrh, Olibanum, Opoponax, black Peruvian Balsam, Podocarpus Resin, Sandarach, Sagapenum, Tolu Balsam, Xanthorrhœa Resin.

Chloroform dissolves completely:

Benzoin, Canada Balsam, Caranna, Ceradia Resin, Conifera Resins and Balsams, Brazilian Copal, Dammar, Dragon's Blood (No. 1–4, 12–17), Guaiacum Resin, Peruvian Guaiacum Resin, Mani Resin, Mastiche, Mecca Balsam, black and white Peruvian Balsam, Tolu Balsam.

Chloroform dissolves incompletely or not at all:

Ammoniac, Assafœtida, Bdellium, Copal, Dragon's Blood of Pterocarpus Draco (No. 5–11), Euphorbium, resin of Euphorb. Tirocalli, Euryops Resin, Galbanum, Gumlac, Gutti, Liquidambar Balsam, Myrrh, Olibanum, Opoponax, Podocarpus Resin, Sagapenum, Sandarach, Sonora Lac, Liquid Storax, Xanthorrhœa Resins.

Acetate of lead produces a precipitate in the alcoholic solution, which is not dissolved on boiling, or but partially:

Ammoniac, Assafœtida (common), Benzoin, Canada Balsam, Caranna, Ceradia Resin, Coniferæ Resins and Balsams, Copal, Dammar (some East Indian specimens), Galbanum, Euphorbium, Resin of Euphorbia Tirocalli, Dragon's Blood of Pterocarpus Draco, Gumlac, Guaiacum Resin, Mani Resin, Mastiche from Bombay, Myrrh (common), Black Peruvian Balsam, Sandarach, Sonora Lac, Liquid Storax, Tolu Balsam, Resin of Xanthorrhœa Arborea, Yellow Xanthorrhœa Resin.

Acetate of lead produces turbidity, which disappears on heating:

African Bdellium, Copaiva, Dammar (some East Indian specimens), Peruvian Guaiacum Resin, Balsam of Liquidambar Styraciflua, Mastiche (common variety), Mastiche from Alexandria, Mecca Balsam.

Acetate of lead produces no turbidity:

Assafœtida, Ferula alliacea Boiss., Indian Bdellium, Caranna (Aceyta Americana), Dammar, Dragon's Blood (No. 1–4, 12–17), Elemi, Gutti, Liquidambar Balsam, Indian Myrrh, Olibanum, Podocarpus Resin, White Peruvian Balsam, Resin of Xanthorrhœa quadrangulare.

Ferric chloride produces in the alcoholic solution turbidity or a precipitate, which is soluble by heat as well as in ether:

Canada Balsam, Dammar (some East Indian specimens).

Ferric chloride produces a precipitate which is insoluble, either by heat or in ether:

Copal, Sonora Lac.

Ferric chloride produces no precipitate, but colors:

Blue: Caranna (Aceyta Americana), Guaiacum Resin.

Black, brown black or *greenish black:* Gutti, Xanthorrhœa Resins, Gumlac.

Dark green: Assafœtida (No. 1–4, 6–7), Benzoin, Black Peruvian Balsam, Storax Balsam, Tolu Balsam, Opoponax, Sagapenum.

Greenish, brownish, or *not at all:* The remaining resins, etc.

Ammonia-water produces a clear mixture with the alcoholic solution:

Caranna (Aceyta Americana), Ceradia Resin, Coniferæ Resins (several specimens), Copal, Dragon's Blood from Pterocarpus Draco, Euryops Resin, Gumlac, Guaiacum Resin, Gutti, Podocarpus Resin, Sandarach, Sonora Lac, Xanthorrhœa Resins.

Ammonia-water produces turbidity:

With the remaining.

Solution of chlorinated lime colors orange-yellow:

Persian Ammoniacum.

Solution of chlorinated lime does not color:

The remaining.

Alcoholic hydrochloric acid is colored:

Brick-red: White Peruvian Balsam, Ceradia Resin.

Red into violet: Caranna (one specimen), Myrrh (common), Euryops Resin.

Blue into violet: Elemi (several specimens).

Yellowish brown into green: Guaiacum Resin.

Yellow, through red brown, into cherry red: Benzoin, Tolu Balsam.

Carmine red: Resin of Xanthorrhœa arborea and quadrangulare.

Greenish to dull violet: Assafœtida (common).

Yellow: Gutti, Caranna (Aceyta Americana).

Light rose: Podocarpus Resin.

Brown of various shades: The remaining.

Concentrated sulphuric acid dissolves:

Cherry red: Benzoin from Siam, Tolu Balsam.

Brown red: Benzoin from Sumatra, Tolu Balsam.

Yellow: Gutti.

Yellow brown, fluorescent: Assafœtida (common).

Brown of various shades: The remaining.

The solution in sulphuric acid produces with alcohol a clear, violet-colored mixture:

Benzoin from Siam and from Sumatra (the latter more red-violet), Euryops Resin, Levantine Galbanum, Tolu Balsam.

Blue violet mixture changing to blue: Levantine Sagapenum.

A clear cherry-red mixture: Red Xanthorrhœa Resin.

A clear green mixture: Guaiacum Resin, Yellow Xanthorrhœa Resin.

A turbid dull violet mixture: Myrrh, Black Peruvian Balsam.

A turbid brown mixture, of various shades: The remaining.

Water precipitates the resins in colored flakes, as follows:

Violet: Benzoin from Siam.

Dull-red violet: Black Peruvian Balsam, Galbanum, African Ammoniacum, Sagapenum, Benzoin from Sumatra, Tolu Balsam, Red Xanthorrhœa Resin.

Yellow: Gamboge.

Blue green or blue black: Guaiacum Resin.

Brown of various shades: The remaining.

Solution of bromine added to the chloroformic extraction, colors either at once or after a time:

Red: Peruvian Guaiac Resin.

Cherry red: White Peruvian Balsam.

Red-violet: Myrrh (common), Caranna (one specimen), Resin of Xanthorrhœa arborea.

Yellowish into violet and blue: Copaiva from Maranham and Para.

Blue: Guaiacum-resin, Caranna (Aceyta Americana), Ceradia Resin, Euryops-resin.

Brown of various shades, or not at all: The remaining.

Solution of bromine forms a flocculent precipitate in the chloroform solution:

Gumlac, Australian Copal.

Carbonate of Sodium solution becomes colored at ordinary temperature:

Violet: Gumlac.

Carmine red: Sonora Lac.

Yellow or yellow red: Assafœtida (common), Dragon's Blood from Pterocarpus Draco, Euphorbium, Guaiacum-resin (at first greenish), Gutti, Xanthorrhœa Resins.

Yellowish, brownish or not at all: The remaining.

Carbonate of Sodium solution becomes colored on boiling:

Violet: Gumlac, Sonora Lac.

Yellow: Assafœtida, Benzoin, Euphorbium, Dragon's Blood, Guaiacum-resin, Black Peruvian Balsam, Sandarach, Storax Balsam. Xanthorrhœa-resins.

Yellowish, brownish or not at all: The remaining.

Acetic acid forms flocculent precipitates in the extractions obtained with carbonate of sodium solution at the ordinary temperature:

Coniferæ-resins and Balsams, Guaiacum-resin, Gutti, Podocarpus-resin, Sandarach, Xanthorrhœa-resins.

Acetic acid does not precipitate or occasions only faint turbidity:

The remaining.

Umbelliferon is yielded by dry distillation from:

Assafœtida (common), African Ammoniacum, Galbanum, Sagapenum.

Sulphuric acid can be determined in:

Assafœtida, Bdellium, Caranna (several specimens), Dragon's Blood (Nos. 1, 14, and 18).

Cinnamic acid was found in:

Benzoin from Sumatra, Dragon's Blood, Liquidambar Balsam, Black Peruvian Balsam, Tolu Balsam, Red Xanthorrhœa-resin.

The Petroleum Ether extraction was colored:

Intense yellow: Gamboge, Euryops-resin.

Dark brown: Mani-resin.

Yellowish or colorless: The remaining.

Solution of Iodine produces with Petroleum Ether extraction a:

Clear violet mixture: Benzoin, Indian Bdellium, Dragon's Blood, Gumlac, Guaiacum-resin, Galbanum, Peruvian Guaiacum-resin, Indian Myrrh, Yellow Xanthorrhœa-resin, Resin of Xanthorrhœa quadrangulare.

Red violet and clear mixture, gradually becoming turbid: Copal, Mastiche, Gutti, Black Peruvian Balsam, Dammar (several specimens), Podocarpus-resin, Sandarach, Storax Balsam, Resin of Xanthorrhœa arborea.

Brown and turbid mixture: The remaining.

Sulphuric acid colors the residue of the evaporation of the Petroleum Ether extraction:

Carmine red: Benzoin from Siam, Guaiacum-resin.

Not at all: Gumlac, Podocarpus-resin.

Yellow or brown of various shades: The remaining.

Chloral reagent gradually colors the residue:

Violet: Myrrh (common), Caranna (one specimen), Euryops-resin.

Carmine red into violet: White Peruvian Balsam.

Rose red into violet: Levantine Galbanum (old commercial specimen), Levantine Sagapenum.

Yellowish or greenish into violet red: Canada Balsam, Coniferæ-resins and Balsams.

Yellow: Caranna (Aceyta Americana), Gamboge.

Green: Mecca Balsam, Dammara Viridis, Persian Galbanum, Persian Sagapenum.

Dull green with rose-colored edges: Levantine Galbanum (the present commercial article).

Greenish: Assafœtida (common), Indian Bdellium, Benzoin from Sumatra, Persian Ammoniacum, Liquidambar Balsam, Black Peruvian Balsam.

Blue into blue-violet: Balsam of Liquidambar Styraciflua.

Not colored at all or but faintly: The remaining.

On warming the residue of the evaporation to 120° (= 248° F.), *it is soft or liquid:*

Assafœtida, Benzoin from Sumatra, Liquidambar Balsam, Opoponax, Black Peruvian Balsam, Tolu Balsam, Sagapenum, Storax Balsam.

The foregoing has rendered it evident that the individual resins, gum resins, and balsams may be recognized, as well as their adulterations, with tolerable certainty, and the author has therefore compiled the following:

C. COURSE OF EXAMINATION OF THE MORE IMPORTANT RESINS, GUM RESINS, AND BALSAMS.

⊕ CHLOROFORM DISSOLVES COMPLETELY.

⊕⊕ ÆTHER DISSOLVES COMPLETELY.

⊕⊕⊕ THE ETHEREAL SOLUTION BECOMES TURBID ON THE ADDITION OF ALCOHOL.

I. The alcoholic solution becomes turbid on addition of ferric chloride, and again clear on boiling. Chloral reagent colors the balsam red violet.

Canada Balsam.

II. The alcoholic solution does not become turbid on addition of ferric chloride.

A. The drug is liquid and forms a clear mixture with petroleum ether.

a. Solution of bromine colors the chloroformic solution yellow, then violet and blue.

Copaiva from Maranham.

b. Solution of bromine produces no color.

Copaiva from Para.

B. The drug is solid and is only partially divided by petroleum ether. Iodine colors violet.

Mastiche (*common variety*).

⊕⊕⊕ THE ETHEREAL SOLUTION FORMS A CLEAR MIXTURE WITH ALCOHOL.

I. Alcohol dissolves completely.

A. Ferric chloride colors the solution blue.

a. Acetate of lead produces a precipitate in the alcoholic solution. Sulphuric acid dissolves the drug with a cherry-red color.

Guaiacum-resin.

b. Acetate of lead does not produce a precipitate. Sulphuric acid dissolves the drug with a yellow brown color.

Caranna (*Aceyta Americana*).

B. Ferric chloride colors the alcoholic solution brownish or greenish.

a. Acetate of lead produces a precipitate in the alcoholic solution, which is not dissolved on boiling.

  aa. Solution of carbonate of sodium dissolves partially at the ordinary temperature. Chloral reagent gradually colors the residue of the evaporation of the petroleum ether extraction red violet, with blue streaks.

    Conifera-resin.
    Conifera balsam.

  bb. Solution of carbonate of sodium does not dissolve, or but very small quantities.

    1. Petroleum ether extraction is colorless. Chloral reagent does not color, or very faint greenish.

      Mastiche from Bombay.

    1. Petroleum ether extraction is colored:

      2. Dark-brown. Chloral reagent colors brown.

        Mani-resin.

      2. Yellow brown. Chloral reagent gradually colors dull red-violet.

        Caranna.

      2. Yellow brown. Chloral reagent colors magnificently violet; solution of bromide likewise.

        Caranna hedionda.

b. Acetate of lead produces in the alcoholic solution a precipitate, which is redissolved on boiling.

  aa. Solution of bromine colors red.

    Peruvian Guaiacum-resin.

  bb. Solution of bromine does not color.

    Mastiche from Alexandria.

c. Acetate of lead does not precipitate. Ammonia produces a turbid mixture.

  Dragon's Blood (*Nos.* 1–4, 12–17).

II. Alcohol dissolves incompletely.

A. Acetate of lead produces turbidity, which disappears on heating.

  Brazilian Copaiva.

B. Acetate of lead produces no precipitate. The drug is distinctly crystalline. Carbonate of sodium does not dissolve, even on boiling.

a. Solution of bromine gradually colors green.
  aa. Alcoholic hydrochloric acid colors violet or blue.
      Elemi.
  bb. Alcoholic hydrochloric acid colors brown.
      Elemi.
b. Solution of bromine colors violet.
      Elemi.
c. Solution of bromine does not color.
      Elemi (Amyris Elemifera, Royle).

⊕⊕ ETHER DISSOLVES INCOMPLETELY.

⊕⊕⊕ ALCOHOL DISSOLVES COMPLETELY.

I. Sulphuric acid colors the residue of evaporation of the petroleum-ether extraction cherry-red. The drug is free from cinnamic acid.
      Benzoin from Siam.

II. Sulphuric acid colors the residue of evaporation of the petroleum-ether extraction not at all or faint brown. The drug contains cinnamic acid.
      Benzoin from Sumatra.
      Tolu-balsam.

III. Sulphuric acid colors the residue of evaporation of the petroleum-ether extraction yellow brown, changing to violet.
      Black Peruvian Balsam.

⊕⊕⊕ Alcohol dissolves incompletely.

I. Ferric chloride produces a precipitate which is neither soluble by boiling nor in ether.
      Brazilian Copal.

II. Ferric chloride produces none or but slight turbidity, which disappears on boiling.
  A. The ethereal solution forms a turbid mixture with alcohol.
    a. Alcoholic hydrochloric acid is colored brownish. Chloral reagent colors the residue of evaporation of the petroleum-ether extraction greenish.
      Dammar.
    b. Alcoholic hydrochloric acid is colored brick red. Chloral reagent colors the residue of evaporation of the petroleum-ether extraction carmine red to violet.

White Peruvian Balsam.

B. The ethereal solution forms a clear mixture with alcohol.

a. Ammonia forms a clear mixture with the alcoholic solution. Solution of bromine colors blue.

Ceradia resin.

b. Ammonia forms a turbid mixture with the alcoholic solution. Solution of bromine colors greenish.

Mecca Balsam.

⊕ CHLOROFORM DISSOLVES INCOMPLETELY OR NOT AT ALL.

⊕⊕ ETHER DISSOLVES COMPLETELY.

⊕⊕⊕ THE ETHEREAL SOLUTION IS RED. AMMONIA FORMS A CLEAR MIXTURE WITH THE ALCOHOLIC SOLUTION.

Dragon's Blood, from Pterocarpus Draco.

⊕⊕⊕ THE ETHEREAL SOLUTION IS YELLOWISH OR COLORLESS.

I. The alcoholic solution forms no precipitate with acetate of lead.

Podocarpus-resin.

II. The alcoholic solution forms with acetate of lead a precipitate, which is not dissolved by boiling.

Sandarach.

⊕⊕ ETHER DISSOLVES INCOMPLETELY.

⊕⊕⊕ THE ETHEREAL SOLUTION BECOMES TURBID ON ADDING ALCOHOL.

I. The alcoholic solution forms a clear mixture with ammonia.

A. The mixture with ammonia is yellow. The solution of the resin in sulphuric acid is yellow brown, and forms with alcohol a clear violet-colored mixture.

Euryops-resin.

B. The mixture with ammonia is carmine red.

Sonora Lac.

II. The alcoholic solution forms a turbid mixture with ammonia.

A. Ferric chloride colors green. The drug contains cinnamic acid. Acetate of lead produces a precipitate.

Liquid Storax.

B. Ferric chloride colors brownish or not at all.

a. The drug contains cinnamic acid and does not produce a precipitate with acetate of lead.

Liquidambar Balsam.

b. The drug contains no cinnamic acid and produces a precipitate with acetate of lead.

Resin of Euphorbia Tirocalli.

⊕⊕⊕ THE ETHEREAL SOLUTION FORMS A CLEAR MIXTURE WITH ALCOHOL.

I. Alcohol dissolves completely. Ferric chlorate colors dark brown black.

A. The solution in alcohol is red.

a. Acetate of lead produces no precipitate. Chloroformic solution is colorless.

Resin of Xanthorrhœa quadrangulare.

b. Acetate of lead produces turbidity. Chloroformic solution is yellow.

Resin of Xanthorrhœa arborea.

B. The alcoholic solution is yellow. Acetate of lead produces a precipitate.

Yellow Xanthorrhœa-resin.

II. Alcohol dissolves incompletely.

A. The alcoholic solution produces a clear mixture with ammonia.

a. The ammoniacal mixture has a violet color. Acetate of lead produces a violet-colored precipitate.

Gumlac.

b. The ammoniacal mixture is yellow or colorless.

aa. Ferric chloride colors the alcoholic extraction black. Acetate of lead produces no precipitate.

Gamboge.

bb. Ferric chloride produces a precipitate, which is neither soluble in ether or by heating. Acetate of lead produces a precipitate.

aaa. Ether-alcohol dissolves the drug readily and completely.

1. Solution of bromine precipitates the resin from its chloroformic solution.

Australian Copal.

1. Solution of bromine does not precipitate.

Manilla Copal.

bbb. Ether alcohol dissolves incompletely.
East Indian Copal.
African Copal.

B. The alcoholic solution forms a turbid mixture with ammonia.

a. Ferric chloride produces a precipitate, which is neither soluble by boiling nor in ether.
Borneo Copal.

b. Ferric chloride does not produce a precipitate.

aa Ether-alcohol dissolves completely. Chloral reagent colors the residue of the evaporation of the petroleum-ether extraction blue to blue violet.
Balsam of Liquidambar Styraciflua.

bb. Ether-alcohol dissolves incompletely.

aaa. The drug contains sulphur.

1. Yields by dry distillation umbelliferon.

2. Hydrochloric acid colors the residue of the petroleum-ether extraction yellow red. Chloral reagent colors green.
Persian Sagapenum.

2. Hydrochloric acid colors blue violet. Chloral reagent rose red to raspberry red and violet.
Levantine Sagapenum.

2. Hydrochloric acid does not color. The solution of the drug is yellow brown and has a blue fluorescence. Nitric acid colors the gum-resin malachite green.
Assafœtida (common).

1. Yields no umbelliferon by dry distillation.

2. Solution of carbonate of sodium is colored light brown by the drug and the extraction is not changed by acetic acid. Acetate of lead produces no change.
Assafœtida from Ferula Alliacea.

2. Solution of carbonate of sodium forms an emulsion which can not be filtered.

3. Acetate of lead produces no precipitate. Solution of iodine is not changed.
Indian Bdellium.

3. Acetate of lead produces a precipitate, either at once or after several minutes, which is dissolved by warming. Solution of iodine is changed.
African Bdellium.

bbb. The drug contains no sulphur.

1. It yields umbelliferon by dry distillation.
2. The residue of evaporation of the petroleum-ether extraction is colored, both by hydrochloric acid and chloral reagent.
3. Hydrochloric acid colors yellow-red. Chloral reagent green.
Persian Galbanum.
3. Hydrochloric acid colors red-violet. Chloral reagent greenish.
Levantine Galbanum.
(As it now occurs in commerce.)
3. Hydrochloric acid colors blue-violet. Chloral reagent carmine-red.
Levantine Galbanum.
(As it formerly occurred in commerce.)
2. Hydrochloric acid does not color. Chloral reagent colors light brown.
African Ammoniacum.
1. No umbelliferon is yielded by dry distillation.
2. Solution of chlorinated lime colors the gum-resin orange yellow.
Persian Ammoniacum.
2. Solution of chlorinated lime does not color.
3. Acetate of lead produces no precipitate.
4. Solution of iodine is changed. Chloral reagent colors greenish.
Olibanum.
4. Solution of iodine is not changed. Chloral reagent does not color.
Indian Myrrh.
3. Acetate of lead produces a precipitate.
4. Solution of bromine colors red-violet. Chloral reagent violet.
Common Myrrh.

4. Solution of bromine does not color, or colors yellowish.
5. Ferric chloride colors green.
   Opoponax.
5. Ferric chloride colors brownish.
   Euphorbium.

Pimaric Acid. — Bruylants confirms Laurent's formula for pimaric acid. The calcium salt, when distilled, yields gaseous hydrocarbons, among which are propene and amylene, and a liquid consisting of a hydrocarbon, C_5H_{10} ($O = 16$), propione and terbene. The hydrocarbon (C_5H_{10}) combines directly with bromine, forming a dibromide, $C_5H_{10}Br_2$. The propione on oxidation with chromic acid yielded propionic acid. Pimarate of sodium, on dry distillation, also gave propionic acid. These decompositions show that pimaric acid is related to turpentine, which may be viewed as a hydride of cymene, and this, in its turn, is related to propyl. J. Chem. Soc., Sept. 1877, p. 341; from Chem. Centralb.

Elemic Acid.—It has been shown by Professor Flückiger (see Proceedings, 1875, p. 216) that there occurs in elemi a crystallized substance, *bryoïdin.* Some time ago E. Buri (Ibid. p. 283) devoted a paper to another crystallizable principle, *amyrin*, and he has since succeeded in isolating a third crystallizable constituent of the same drug, which, in distinction from the other two, possesses undoubted acid characters, and which he has therefore named *elemic acid.* It was contained in the alcoholic mother liquor, from which crystallized amyrin was obtained. On evaporating this liquor an amorphous brown resin remains, which, with the same weight of petroleum spirit (boiling at 60° C., = 140° F.) yields a clear solution; this, however, becomes turbid on addition of a large quantity of petroleum spirit. The mixture is then shaken with nearly the same volume of a 10 per cent. solution of potassa, when it separates into two liquid layers and a jelly. This jelly, which is easily collected, is then mixed with water, with which it forms an emulsion, becoming quite clear on the addition of ether. The ethereal layer contains a little resin, the lower layer being chiefly a solution of elemate of potassium, from which *elemic acid*, still accompanied by an *amorphous resin of an acid character*, is precipitated by hydrochloric acid. The same crude elemic acid may also be obtained by a second process, in which the use of petroleum spirit is omitted, the resin being dissolved in ether, shaken with caustic potassa, and diluted with much water, which causes a separation into two layers; the elemic acid is then precipitated as before, and the crude product, as obtained by either method, is purified by repeated crystallization from hot alcohol, about 0.820 specific gravity, the crystals being washed with cold alcohol. This purification is by no means easy; but when pure the elemic acid forms very brilliant and colorless crystals, which are larger than those of both amyrin and bryoïdin. Each of these crystals, however, appears to be formed of very intimately aggregated individual crystals, and the author has, therefore, found it impossible to ascertain their crystallographic characters.

Elemic acid melts at 215° C. (= 419° F.), and on cooling, is an amorphous mass, which may be again crystallized from alcohol. By continued heating, even when not fused, it turns brownish. It is readily soluble in ether, methylic, ethylic, or amylic alcohol; sparingly so in bisulphide of carbon; not at all in water; requires 17.55 parts of alcohol, 0.826 sp. gr., for solution at 15° C. (= 59° F.), and is much more abundantly and readily soluble in hot alcohol. The alcoholic solution, especially when diluted with a little water, decidedly reddens litmus; alcoholic solutions of the salts of the metals are not precipitated by it. The solution of the acid is lævogyre. Its ultimate composition corresponds to the formula $C_{35}H_{56}O_4$ or $(C_5H_8)_7\ O_4$ $(O = 16)$; and when written by the latter formula it is shown to be allied both with bryoïdin and amyrin, as well as the other derivatives of terpene, C_5H_8.

The author, furthermore, describes the compounds of elemic acid with bases.

Elemate of potassium may be obtained in crystals, but with difficulty, and forms needle-shaped crystals. It cannot be crystallized from alcohol, ether, or *pure* water; the latter, in fact, appears to decompose it, but the solution becomes clear again on the addition of a little potassa, while a larger amount precipitates the salt again. When dry, elemate of potassium is a perfectly white crystalline substance, which cannot be entirely deprived of water over concentrated sulphuric acid; and while the water is eliminated at 125° to 130° C. (= 257° to 266° F.), this cannot be done without decomposing the salt.

Elemate of sodium has been ascertained to be perfectly analogous to the potassium salt, yet seems to be incapable of crystallization.

Elemate of silver is formed when alcoholic solution of elemate of potassium and aqueous solution of nitrate of silver are mixed. The gelatinous precipitate, resembling hydroxide of aluminum, displayed a reddish-brown color, but when expressed, dissolved in ether, and the ethereal solution evaporated, is white, very light, becomes electric on rubbing, and is very soluble in hot alcohol, from which, however, it cannot be obtained in crystals. It is not easily altered on exposure to air.

Other metallic salts of elemic acid can be obtained by means of the alcoholic solution of elemate of potassium, all of them being amorphous. A solid compound of ammonic and elemic acid can not be obtained.

The amorphous acid resin and the *amorphous indifferent resin* require further investigation. They constitute the prevailing amount of the drug of the market—the elemi of Manilla. Amyrin also occurs in large amount; not so the acid crystalline principle under consideration. Ph. J. Trans., Feb. 2d, 1878, p. 601.

Amber.—O. Helm, after reviewing the varieties of amber and the localities in which it is found, contributes his observations on some of its physical and chemical characters. The quality of amber differs, not only in its appearance, but also in its chemical composition; the difference in its sp. gr. is also not insignificant. Berzelius gives its sp. gr. at between 1.065 and 1.070; the author, who has taken the sp. gr. of a large number of specimens, finds it to vary between 1.05 and 1.095, and the white modification is often much lighter; indeed the author is in possession of several pieces, the sp. gr. of which is below 1.0. The color of amber also varies extraordinarily; it embraces all tints, from the lightest wine-yellow to the darkest wine-red; it occurs in all grades of transparenry and opaqueness, and is found in colors varying from chalk whiteness, light brown, and dark-brown black, with intermediate tints of gray yellow, brownish red, etc. The author finds the solubility of amber in alcohol and ether to vary from that stated by Heyer, who found it to dissolve from 10 to 12 per cent. The ordinary clear light-yellow to golden-yellow amber yields: to ether, 18 to 23 per cent.; to alcohol, 20 to 25 per cent.; to oil of turpentine, 25 per cent.; to chloroform, 20.6 per cent.; to benzin (benzole? Rep.), traces. The opaque variety resisted the effect of solvents somewhat more: ether dissolved 16 to 20 per cent.; alcohol, 17 to 22 per cent. The residue, after the extraction by alcohol, yielded to ether 6.2 per cent.; to chloroform, after that, 0.015 per cent. The residue of evaporation of the ethereal or alcoholic solution is a brittle, readily pulverized resin, having the peculiar odor of amber in a high degree. Ether dissolves the greater part of the residue of evaporation of the alcoholic solution, and alcohol that from ethereal solution. The residue of the latter extraction is soluble only in ether, and this may also be obtained by extracting the resin, after its extraction with alcohol, with ether direct, but it must be treated with alcohol in order to remove a small adhering resin that is soluble in alcohol. The resin soluble only in ether becomes soft at 142° C. (= 287.6° F.), and melts at 146° C. (=294.8° F.), while the resin soluble in alcohol becomes soft below 100° C. (= 212° F.), and melts at 105° C. (= 221° F.). The mixed resin obtained direct from amber by ether also softens below 100° C. (= 212° F.), but does not melt completely below 140° C. (= 284° F.). The solvent that dissolves the greatest proportion of the amber is doubtless oil of turpentine. Dakin has stated, that by the action of high temperature in a sealed tube he has succeeded in dissolving the amber completely in that liquid. The author has endeavored to do this, and heated the liquid to the melting-point of the amber, but failed to effect complete solution.

Besides the before-mentioned resins, amber contains only a resin soluble in alcoholic solution of potassa, small quantities of succinic acid, and a bituminous body which is insoluble in all solvents. The succinic acid exists in the amber in combination, which, as is well known, may be decomposed by careful heating, and the succinic acid (3 to 5 per cent.) obtained as sublimate. For the quantitative determination of the latter, however, the author has adopted a wet method, which is as follows:

A weighed quantity of finely-powdered amber is digested in a well-stoppered flask with a freshly prepared alcoholic solution of potassa or soda, the insoluble portion is collected on a filter, washed with alcohol, and then with water to remove the alkaline succinates and carbonic acid. The residue of *bitumen* amounts to 44–60 per cent. of the amber, and constitutes, when dry, a very friable white powder, retaining a little alkali, which is difficult to melt, and gives off during the heating the peculiar odor of amber. The alcoholic filtrate is evaporated, the residue, which smells strongly of oil of amber, is mixed with the aqueous washings and hydrochloric acid, in excess, and heated; a resin-like, bitter, yellowish body, amounting to 34–46 per cent. of the amber and tenaciously retaining some alkali, remains undissolved. The solution contains all the succinic acid in combination with the alkali (potassa). It is concentrated by evaporation and treated with a clear solution of chloride of barium in alcohol and ammonia, which precipitates—completely after longer standing—the succinic acid as bibasic succinates of barium. The precipitate is well washed with alcohol, dried, and is then either weighed direct and the succinic acid ascertained by calculation, or it is decomposed by sulphuric acid and the succinic acid obtained as hydrate. The latter method is more accurate and yields the acid in pure crystalline condition. Twelve samples of Prussian amber were examined by this method, and contained from 3.2 to 8.2 per cent. of succinic acid (= 3.7 to 9.4 per cent. of hydrated acid). The clear varieties contained the least (3.2 to 4.5 per cent), the somewhat more crude 4 to 6.2 per cent., and the white (opaque) varieties 5.5 to 7.8 per cent; while the disintegrated layers contained 8.2 per cent.

By appropriate methods, which have already been sufficiently indicated, the author has found Prussian amber to have the following proximate composition:

1. A resin soluble in alcohol, melting-point 105° C. (= 221° F.), amounting to 17–22 per cent.
2. A resin insoluble in alcohol, soluble in ether, melting-point 145° C. (= 293° F.), amounting to 5–6 per cent.
3. A resin insoluble in alcohol and ether, soluble in alcoholic solution of potassa, melting-point 175° C. (= 347° F.), amounting to 7–9 per cent.
4. A bitumen insoluble in all of the solvents named, amounting to 44–60 per cent.
5. Succinic acid, amounting to 3.2 to 8.2 per cent.

The elementary analysis of amber gave to Schrötter, besides a small quantity of nitrogen: 78.60 per cent. C., 10.19 per cent. H., and 10.99 per cent. O. Draping found in amber collected by him at Trahenières: 80.59 C., 7.31 H., 6.73 O., and 3.27 ash. The author never found such large quantities of ash, and it appears probable that the amber examined by Draping was distinct from Prussian amber, its organic components differing also. He found 0.08 to 0.12 per cent. of ash, composed of lime, silica, oxide of iron and sulphuric acid. The succinic acid is not combined with mineral matter. The author's experiments do not confirm Baudrimont's statement that amber contains sulphur in organic combination. Its presence is attributable only to sulphuric acid, and although rarely, to crystals of iron pyrites.

The author considers it probable that most of the ambers so called, which are collected elsewhere than in the Prussian provinces, or the immediately adjacent countries, are not amber at all, although sometimes intimately related to it. He has examined a specimen of "Syrian" amber, which he describes as having considerable resemblance to a variety of amber occasionally found on the coast of the Baltic, and which is known as friable ("mürber") amber. This is distinguished from the ordinary variety:

1. By its low melting-point, which is near 140° C. (284° F.), while the ordinary requires a temperature of 300° C. (=572° F.).
2. By being less hard.
3. By its greater solubility in ether (39.3 to 53 per cent.), and other solvents.
4. By the higher melting-point of the portion of resin soluble in ether 170° C. (= 308° F.).
5. By the lack of, or, more correctly, the materially less quantity of succinic acid.

From copal and other resins it is distinguished:

1. By its higher melting-point.
2. By its greater hardness.
3. By its inferior solubility in ether and other solvents.
4. By the odor of amber evolved when heated.

Arch. f. Ph., Sept., 1877, pp. 229–246.

Rehoux also contributes a paper on amber, reviewing its origin and character. True amber may be distinguished from artificial amber and from every substance having any physical analogy to it, especially copal, by the following characters: Copal is yellow, more or less deep, but always unicolorous; it has on its surface some yellow points like crystallized sulphur. Amber, on the contrary, has always one end of a different shade from the other. If a sample is rubbed for a few seconds upon the palm of the hand near the little finger, if it exhales a strong aromatic odor, it is amber, for neither copal nor artificial amber has any odor. On prolonged exposure to the air, amber sometimes loses its essential oil and its characteristic aspect. If copal is scraped with the blade of a knife a fine dust is given off, which rises in the air. If amber is scraped the raspings fall downwards. If amber is gently heated at the flame of a candle it may be bent, whilst artificial amber and copal are inflexible under the same circumstances. Natural amber resists pressure with the nails, whilst fictitious amber and copal are indented. Copal melts at 100° C. (=212° F.), and when liquefied preserves its yellow color. Amber does not melt below 400° C. (= 752° F.) (? see above, Rep.); it blackens and gives off a very distinct odor of sulphuretted hydrogen. Its sp. gr. is 1.09 to 1.11, that of copal being 1.04, and that of artificial amber 1.05. Ch. News, Jan. 18th, 1878, p. 31; from Annales de Chimie.

Prof. X. Landerer considers it probable that *Elektron*, the Greek name for amber, is derived from the Phœnician *elek*, which signifies a resinous exudation. The Arabs of the present day call amber *elek*. A. J. Ph., April, 1878, p. 176.

ALCOHOLS, ETHERS, ETC.

Ethyl-Alcohol—Presence in Coal Tar.—O. Witt draws attention to the fact that he has obtained by the fractional treatment of benzol—the crude product of English commerce—a portion of liquid, which, when treated with iodine and carbonate of potassium, yielded iodoform. By suitable treatment he also obtained a body which corresponded in all its characters, boiling-point, etc., with iodide of ethyl, and he concluded from this the presence of ethylic alcohol. A series of experiments, made with the products obtained in working up 150,000 kilos of crude benzol, have proved the presence of ethylic alcohol to the average amount of 0.2 per cent. Zeitschr. Œst. Ap. Ver., Nov. 11th, 1878, p. 166.

Alcohol—Commercial Chlorine Derivatives.—J. Biel reviews the chlorine derivatives of alcohol at present used in medicine, most of which are either by-products of the manufacture of chloral or may be obtained from the latter direct. Many of these products, however, are of very heterogeneous composition as they occur in commerce, and it is, therefore, important that the pharmacist should have the means of determining their identity and purity. To this end the author regards the determination of their specific gravity and boiling-point to be the most important aids; but, while the former is often resorted to, the determination of the boiling-point is too often neglected, notwithstanding its ready execution. In ascertaining the boiling-point the thermometer should not be immersed in the liquid, but it should be surrounded as far as possible by the vapor of the boiling liquid. It is also necessary to distil off the entire quantity of liquid taken in operation, because the impurities usually pass over towards the end of the distillation. Small differences of 5° in the beginning of the distillation need not ordinarily be taken into account, but the remainder that passes over must have a constant boiling-point. The author first draws attention to the preparation of *chloral hydrate*. Chlorine gas, washed, and dried by sulphuric acid, is passed continuously for 12–14 days through a row of 30–40 large glass flasks containing 98° alcohol; the flasks are cooled at first, but towards the last are heated to 60°–75° C. (= 140°–167° F.). The process is ended when the liquid has a sp. gr. of 1.40. The chlorated alcohol is now carefully boiled with its weight of sulphuric acid in large copper stills, lined with lead. Large quantities of gaseous chlor-ethyl, hydrochloric acid, and an entire series of by-products are vaporized, and condensed by suitable means. Finally chloral, which boils at 94° C. (= 201.2° F.), passes over, and when the temperature reaches 100° C. (= 212° F.), all the chloral has passed over, and the distillation is intercepted. The chloral is now neutralized with chalk, again distilled, finally water added just sufficient to form hydrate and rapidly cooled. The congealed mass forms the "chloral in crusts" of commerce. This is now being replaced by the handsome, bright, glistening rhomboidal-crystals of chloral, which are obtained by recrystallization from boiling chloroform, and are preferable to the variety "in crusts," on account of their greater resistance to the oxidizing influence of the air, which, in common chloral, soon communicates acid reaction and a pungent odor.

Competition, and the consequent reduction in price, have made it necessary that manufactures should seek channels through which the enormous quantities of by-products resulting from the manufacture of chloral should find utilization. These efforts have resulted in the introduction of most of the chlorine derivatives of alcohol, now found in commerce, into medicine. It is through these efforts that Krämer determined the presence of large quantities of *chlor-æthyliden* in these by-products, and, in connection with Pinner, discovered *croton-chloral* (more recently named *butyl-chloral*); both of which find medicinal application. Krämer also believed that he had discovered *chloride of elayl* in these by-products; but the experiments of Genther and Stapp, and, subsequently, of Städel, render this improbable.

In order to recognize the importance and the formation of these by-products, it is necessary to review the chemical reactions that occur during the preparation of chloral.

When chlorine is caused to react upon nearly absolute alcohol, *aldehyde* is first produced; this forms with alcohol *acetal*, which by substitution is converted into *trichloracetal;* this forms with the hydrochloric acid produced *chloral-alcoholate* and *chlor-ethyl.* The last is converted by the alcohol still present into ether, which, by the continued action of the chlorine is converted into *Mono-*, *Di-*, *Tri-* and finally *Tetra-chloric ether.* The subsequent distillation with sulphuric acid splits the chloral-alcoholate into *chloral* and *ethyl-sulphuric acid;* the tetra-chloric ether is also so converted, while the ethyl-sulphuric acid is by the hydrochloric acid converted into *chlor-ethyl* and sulphuric acid.

If, however, the chlorine is allowed to react further upon the tetra-chloric ether, *penta-chloric ether* ($C_2H_5OC_2Cl_5$—having a sp. gr. of 1.65) is produced, which yields no chloral with sulphuric acid. For this reason the current of chlorine is intercepted when the liquid in the flask has reached a density of 1.40.

By the action of chlorine upon chlor-ethyl, the following substitution compounds are produced:

Æthyliden-chloride ($CH_3,CHCl_2$); *Dichlor-æthylchloride* (CH_3,CCl_3); *Trichloræthyl chloride* (CH_2Cl,CCl_3); Tetra-chloræthyl chloride ($CHCl_2,CCl_3$), and, as end-product Hexachloride of carbon (CCl_3,CCl_3), — ($O = 16$).

From the intermediate members of this group of by-products, a very variable mixture is produced, and is sold under the name of "*Liquor anæstheticus.*" The lower members of the group compose mainly the "*Liquor anæstheticus Aranii,*" which boils between 64° and 100° C. (= 147.2° and 212° F.); while the higher chlorinated members of the group constitute the "*Liquor anæstheticus Wiggers*, and boils at from 100° to 140° C. (= 212° to 284° F.). The final product is crystalline, and is known in commerce under the name of "*sesquichloride of carbon.*"

Regarding *croton-chloral* (Butyl-chloral), the author observes that the investigations are not yet completed. It is known, however, that it is formed by the union of two molecules of aldehyde and subsequent action of chlorine. Croton-chloral is distinguished from ordinary chloral by its melting-point, which is at 78° C. (= 172.4° F.), while ordinary chloral melts at 56° C. (= 132.8° F.), and by its products of decomposition. Ethyl-chloral is decomposed by alkalies, as is well known, into chloroform and formic acid, while croton-chloral forms dichlorallylen and formic acid. *Dichlorallylen* is a pleasantly odorous liquid boiling at 78° C. (= 172.4° F.). It possesses, however, very little stability, being decomposed slowly even at the ordinary temperature, acquiring an unpleasant odor, and eliminating gaseous hydrochloric acid. This decomposition is also observed in inferior *chloroform*, and it is, therefore, highly probable that the spontaneous decomposition of some grades of chloroform is due to the presence of dichlorallylen, introduced possibly by the use of raw spirit in its manufacture, which contains material quantities of aldehyde.

Since in the production of chloroform from alcohol and chlorinated lime the intermediate formation of chloral is now generally assumed, it has been believed that a specially pure article of chloroform could be obtained from pure chloral hydrate by the action of alkalies. That this is not true has been already noticed by others (see Proceedings, 1876, p. 290), and is supported by the author's experiments. Ph. Zeitschr. f. Russ, June 1st, 1877, p. 321.

Alcohol—Detecting its Presence in Essential Oils.—E. W. Davy, in 1876, communicated to the Pharmaceutical Society a new method for the detection of alcohol, which is based upon the production of an azure blue coloration when a solution of molybdic acid in sulphuric acid (see Proceedings, 1877, p. 275) is added to a liquid containing ethyl-alcohol. He has since made further experiments and finds it a very delicate test for the presence of even minute quantities of alcohol in essential oils. The suspected oil is shaken with distilled water, the aqueous layer is removed when clear, and a drop or two of this will then develop with the test solution a deep azure blue coloration; if this is not produced at the ordinary temperature, the application of heat will produce it when the quantity of alcohol is very minute. After shaking with pure essential oil, the water will either not be affected or a faint yellowish brown or light-brown tint will be produced; occasionally also an olive or gray is developed; but all of these tints soon fade, leaving the liquid colorless or nearly so, while the blue color produced by alcohol is much more permanent. The author recommends and describes a testing-tube suitable for his test: A glass tube of about four inches in length and about a quarter of an inch in diameter in its internal base is drawn out at one end to a fine point, leaving a very small opening; the edges of the other end are simply rounded by fusion, this orifice serving for the insertion of a cork. The small hole being closed by one of the fingers, the tube is filled about one-third full of distilled water, and then about an equal volume of the suspected oil is added. A tight cork is then inserted in the larger end, the finger being still kept on the small hole, and the contents of the tube are strongly agitated for a few moments; after which the pointed end is turned upwards, the finger removed to allow the condensed air to escape, the tube again reversed and allowed to stand at rest on a proper support until the two liquids have separated and become clear. A drop or more of the aqueous liquid may then be removed by the warmth of the hand when in contact with the upper part of the tube, or by slightly raising the cork. The loss of aqueous liquid from the capillary end of the tube, when kept in the position described, is quite insignificant even after long standing. Ph. J. Trans., Sept. 15th, 1877, p. 201.

Sulphovinate of Sodium—Formula of the Pharm. Society of Paris.—Prepare first, sulphovinic acid by pouring very gradually, and in small quantities at a time, under constant stirring, 1000 grams of sulphuric acid, sp. gr. 1706, into 1000 grams of alcohol of 96 per cent. Let the mixture stand several hours, then dilute with 4 liters of distilled water, and saturate the liquid with pure carbonate of barium. Allow the sulphate of barium to settle and filter. The filtrate is decomposed by a solution of carbonate of sodium, until no more precipitate is formed. The clear filtrate is evaporated so as to form crystals, which are purified, if necessary, by recrystallization. The crystals must be kept in well-stoppered vials. The yield is about 1000 grams. Sulphovinate of sodium crystallizes in hexagonal tables; it has a slightly unctuous feel, is very soluble in water and alcohol, and when heated in a capsule to 120° C. (= 248° F.), it disengages alcohol. It is almost free from bitterness, should have no acrid taste, and must contain no sulphate, and must likewise be free from barium. New Rem., Sept. 1877, p. 285.

Ethylic-Ether — Freezing-Point.—A. P. N. Franchimont has made experiments which fully confirm the statements of Thénard and Milschell, and accepted in the textbook of Kolbe and Kekulé, that pure ether does not become solid at —50° C. (= —58° F.), and remains liquid even at —99° C. (= —146.2° F.). In the beginning of this century Fourcroy and Vauquelin had stated, that ether begins to crystallize at —31° C. (= —23.8° F.), forming long, glistening white leaflets, and that at —44° C. (= —47.2° F.) it forms a solid crystalline mass. The author has found that ether which contained a little water formed at —45° C. (= —49° F.) a white flocculent matter, while ordinary ether formed this flocculent deposit already at —31° C. (= —23.8° F.); but the quantity of this matter was not increased by a greater reduction of temperature—even lower than —80° C. (= —112° F.), at which temperature pure and absolutely dry ether remained perfectly limpid. The formation of the flocculent matter is doubtless due to the freezing of water. Zeitschr. Œst. Ap. Ver., 10, 1877, p. 562.

Ether—Power to Dissolve Alkalies.—It has hitherto been supposed that the alkalies are insoluble in ether, but having been led to doubt the truth of this supposition, W. Skey undertook a series of experiments by which he has determined that alkalies as well as their inferior carbonates are soluble to a certain degree both in hydrous and anhydrous ether. In hydrous ether both magnesia and lime dissolve also to a notable extent. Bicarbonate of sodium, however, hardly appears to do so, or, if so, only in minute quantities. When anhydrous ether is mixed with dry caustic potassa, allowed to clear, and then decanted off, a marked alkaline reaction is obtained by dipping reddened litmus into it, and which is more intense than can be occasioned by any minute trace of alkaline acetate possibly present in the ether, resulting from the inter-reaction of the potash upon it. These observations are important in connection with the isolation of alkaloids by Stas's process, in which bicarbonate of sodium, or, better still, an earthy carbonate should take the place of the caustic alkali now employed.

The author furthermore finds that many salts are soluble in *anhydrous ether* to a notable extent, which are insoluble, or nearly so, in hydrous ether, for instance, the chlorides of calcium, nickel, zinc, cadmium, and platinum, also the sulphocyanides of nickel, copper, and zinc. The addition of a small quantity of water to any of these ethereal solutions generally renders them very turbid, as the salt they contain is thereby precipitated as a hydrate.

By the use of anhydrous ether, and by conducting the necessary evaporations in dried air, it is in fact possible to form many saline compounds hardly—if at all—producible otherwise. Ch. News, Aug. 3d, 1877, p. 48.

Nitrous Ether—Determinations.—Theo. Rosenbladt, who has operated by Feldhaus's method for determining nitrous ether,* and found it to give variable results, recommends the following method: 10 cc. of spirit of nitrous ether are poured into a flask, with a wide neck, of 30 cc. capacity; some alcoholic solution of potassium is added. The flask is well corked and digested for some time. The product of the reaction is oxyhydrate and nitrate of potassium. When the reaction is complete the alcohol is evaporated, 10 cc. of concentrated solution of chloride of ammonia is added, and the flask is closed with a doubly perforated rubber stopper, provided with tubes. One of these is attached to a carbonic acid generator (Kipps's), the other dips into a vessel containing solution of potash. As soon as the air in the apparatus is replaced by carbonic acid, the tube dipping into the solution of potassa is connected with a small gasometer (such as is used for organic nitrogen determinations), filled with solution of potassa; the flask is heated gradually and the contents are boiled until the decomposition of the nitrate of ammonium (formed by double decomposition between the chloride of ammonium and nitrate of potassium) is complete: *i. e.*, until nitrogen is no longer evolved. Carbonic acid is then again passed through the apparatus to drive all the nitrogen into the gasometer. When the volume of nitrogen is constant in the gasometer it is, in the well-known manner, transferred to the endiometer and the volume of nitrogen determined, the height of the barometer and temperature (in degrees C.) of the room being noted. The true volume of nitrogen is then calculated by the following formula:

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* *Feldhaus's Method of Determining Nitrous Ether in Spir. Nitri. Dulc.*—20 grams spir. nitri. dulc. are heated to 100° C. (= 212° F.), with a slight excess of solution of potassa in 3 parts of alcohol. This is best done in a strong glass-stoppered vial, which is secured from leakage by rubbing a little tallow on the stopper and tying over with linen. The decomposition is complete in 5 minutes, whereas, at the ordinary temperature, traces of nitrous ether will be evidenced even after several days' standing. The mixture is then diluted to 200 cc.; 50 cc. of this solution, acidulated with a few cc. of dilute sulphuric acid, are diluted with an equal volume of water, brought to 15° C (= 59° F.), and titrated with solution of permanganate of potassium until the color is no longer changed within 2 or 3 minutes. The solution of permanganate of potassium is obtained by dissolving 10 grams of crystallized permanganate in 1 liter of water, and its liter is then determined by means of iron, so that 5 cc. shall contain 1 milligram-equivalent of active oxygen. 10 cc of this solution are equal to 1 milligram-equivalent of nitrous acid. Rosenbladt attributes the variable results obtained by him with this method to the presence of organic substances; but as these can only be of a volatile nature, this objection can be removed by evaporating the alcoholic liquid, after the reaction with potassa, to dryness, and determining the nitrous acid in the residue according to the directions.—Rep.

$$\frac{a \qquad (w-b)}{760\ (1.0{,}003367.t)} = \mathrm{V}$$

a = the volume of nitrogen noted;
w = the tension of watery vapor;
b = the present height of the barometer;
t = the temperature (in C. degree) of the room;
v = the true volume of nitrogen.

The volume of nitrogen in cc. so calculated, when multiplied by 0.00336, gives the weight (in grams) of the nitrous ether contained in the quantity of spirit of nitrous ether used. Ph. Zeitschr. f. Russ., May, 1877, p. 257.

Spirits of Nitrous Ether, U. S. P.—C. Lewis Diehl contributes a lengthy paper on the officinal spirit of nitrous ether. He finds that it is difficult to obtain the quantity of distillate (15 fluid ounces) required by the Pharmacopœia, but that it is possible to obtain that quantity by continuing the heat for a considerable time after the reaction has ceased. If the condensing facilities are good, the quantity of distillates obtained during the reaction contains all the nitrous ether that can be produced by the quantity of nitric acid employed, and he therefore regards it unnecessary to continue the heat after the reaction. He draws attention to an inaccuracy in the statement of the strength of the officinal preparation, which is stated to contain 5 per cent. of its peculiar ether, while, if all the nitric acid is consumed in the formation of nitrous ether (and this he considers probable), the preparation can only contain 4.1766 per cent. The specific gravity of the preparation is also not correctly stated. He finds it to vary between 0.822 and 0.825, figures which correspond very closely to the calculated sp. gr. = 0.8235. The "Pharmacopœia" states the sp. gr. of spirit of nitrous ether to be 0.837, an increase of .020 over the sp. gr. of the stronger alcohol (sp. gr. 0.817) employed. The "British Pharmacopœia" directs the use of rectified spirit (sp. gr. 0.838) and gives the sp. gr. of its spirit to be 0.845, an increase of only 00.7 over that of the rectified spirit, notwithstanding that the spirit of the Br. Ph. is about twice as strong as the U. S. preparation. Manifestly the statement in the U. S. Pharm. is based on error. Finally, the author draws attention to the fact that in the method of the British Pharmacopœia for adjusting the strength of its spirit—agitation of the distillate with twice its volume of saturated solution of chloride of calcium, and dilution of the spirit to such strength, that two volumes of ethereal liquid will separate when one hundred volumes are so treated—we have a method by which the spirit of our Pharmacopœia can be adjusted to uniform strength, at least in so far as regards such crude nitrous ether as is separated under these conditions. The distillate obtained by the Pharmacopœia process is diluted to 32 fluid ounces, and 100 volumes are agitated with 200 volumes of saturated solution of chloride of calcium. The total quantity of crude nitrous ether is obtained by adding 8 volumes to the number of volumes separated, and the concentrated spirit is then diluted with stronger alcohol to such strength that 5 volumes shall be represented in every 100 volumes of finished spirit. It is calculated that 8 volumes of crude nitrous ether are retained in solution when applying the above test; hence the necessity of adding 8 volumes to that separated. For this reason, also, the test cannot be applied to the finished spirit of the U. S. Pharm., since it contains only 5 per cent. of crude nitrous ether. A. J. Ph., July, 1877, pp. 362–370.

Spirit of Nitrous Ether.—Prof. James W. Mill also records some experiments made on the subject of spirit of nitrous ether. He finds that when some insoluble substance, such as pumice, pieces of glass, etc., which afford numerous points of exit for the ethereal vapor formed, are introduced into the retort, the relation of nitric acid to alcohol may be comparatively large, and the reaction will go on safely to the end. He prefers the use of nitric acid and alcohol alone for the purpose of making spirit of nitrous ether, and proceeds as follows:

Into a glass retort, having a capacity of about two and a half pints and containing some sand and pieces of glass, with fifteen or twenty small pieces of pumice-stone, introduce a mixture of ten fluid ounces of nitric acid, sp. gr. 1.42, and twenty-six fluid ounces of stronger alcohol; connect the retort with a capacious Liebig's condenser, this with a receiving-bottle capable of holding twenty fluid ounces, and this again with a small bottle containing two fluid ounces of alcohol. The condenser must be fed with ice-water and the receiving-bottle surrounded with ice. Apply heat through the medium of a sand- or water-bath and as soon as the reaction begins immediately withdraw it. The process will then take care of itself. The temperature at the beginning of the reaction is about 150° and quickly rises to 176°, which temperature is not exceeded during the whole process, falling gradually as the reaction slackens. Remove the distillate; add to it twice its volume of water, cold, and containing suspended in it 120 grains of calcined magnesia. Then, by means of a separating funnel, or an ordinary bottle arranged with two tubes, a longer and a shorter, in the well-known way, separate the ether which rises to the surface. To every five fluid ounces of this ether add ninety-five fluid ounces of stronger alcohol.

Spirit of nitre made in this way is but slightly, not much more than alcohol itself, affected by dilute solution of potassic hydrate; has the color, odor, and taste required by the Pharmacopœia; contains five per cent. of crude nitrous ether, and has the sp. gr. 0.823.

The distillate by this formula usually measures about eighteen fluid ounces, and has a specific gravity, at 50°, of 0.900. Treated with twice its volume of water, it yields half its volume, or nine fluid ounces, of crude nitrous ether, having a sp. gr. at 50° of 0.940. If one fluid ounce of the ether is mixed with 9 fluid ounces of stronger alcohol, a spirit having a sp. gr. 0.828 is formed; if the quantity of ether is reduced to half a fluid ounce and the alcohol increased to nine and a half fluid ounces, so as to form the above five per cent. spirit, the sp. gr. is, as above stated, 0.823; but if a five per cent. spirit is produced by mixing the distillate with sufficient stronger alcohol (1 to 9), the sp. gr. of the resulting spirit is the same as that obtained by mixing 1 fl.oz. of ether and 9 of stronger alcohol, viz., 0.828. (The author attempts to account for this discrepancy by assuming the alcohol that distils over with the ether to have a higher sp. gr. than the stronger alcohol used, but this does not explain why a mixture of 1 fl. oz. of *distillate*, having a sp. gr. 0.900, when mixed with 9 fl. ozs. of alcohol, should have as high a specific gravity as a mixture of *ether*, having a sp. gr. 0.910, when mixed with the same alcohol in the same proportion.—REP.)

The author, furthermore, records some experiments made to determine the solubility of the crude ether, obtained by the above process, in saturated solution of chloride of calcium, B. P., in water, and saturated solution of chloride of sodium. The following tables show his results with solution of chloride of calcium, and with water:

Sat. Sol. Calc. Chlor. cc.	Nitrous Ether, cc.	Alc. fort. cc.	Ether separated, cc.	Ether absorbed, per cent.
20	10		9.7	3
20	5	5	5.2	
20	1	9	0.5	5
20	0.5	9.5	trace.	

Distilled Water, cc.	Nitrous Ether, cc.	Alc. fort, cc.	Ether separated, cc.	Ether absorbed, per cent.
20	10		9.5	5
20	5	5	4.4	6
20	1	9	0.2	8
20	0.5	9.5	none.	

Parallel experiments were made with a saturated solution of chloride of sodium, in all of which a much larger proportion of ethereal liquid was separated than by either solution of chloride of calcium or water.

The author has also operated by the Pharmacopœia process for making spirit of nitrous ether, and has been unable to obtain the quantity of distillate required by that standard. He obtained only seven and one-half fluid ounces of distillate, which had a sp. gr. 0.886, and when shaken with two volumes of water separated 3.07 fluid ounces of crude ether. The finished spirit had the sp. gr. 0.823. By adding to the residue in the retort four and a half troy ounces more of nitric acid, he obtained an additional distillate, amounting to seven and three-fourths fluid ounces, having a sp. gr. at 50° of 0.903, and yielding when shaken with 2 volumes of water, 5.42 fluid ounces of crude ether. In this second operation the reaction was exceedingly active and energetic, and this, together with the very much larger yield, leads the author to the inference that etherification is not fairly established till the proportion of alcohol to acid has been reduced to at least four volumes to one. The Pharm., May, 1878, p. 129–136.

F. A. Goodman, in the same Journal, records the result of some experiments, which are mainly intended to test the conclusions arrived at by C. Lewis Diehl in his paper above referred to. The author made a series of twelve distillations, eight of which were made with the officinal materials and proportions; the first seven with one half the quantity, and differing only in the manipulation; the other four were made by distinct methods:

No. 1. Pharmacopœia process strictly followed; first distillate, 6 fl. ozs.; second distillate, two ounces; time, 2.28; mean temp., 160° F.; sp. gr., not taken.

No. 2. Officinal proportions distilled at once; first distillate, 9½ fl. ozs.; second distillate (by inference—Rep.), 2 fl. ozs.; time, 2.20; mean temp., 144° F.; finished spirit marked 40° B.; sp. gr., 0.830.

No. 3. Officinal proportions; sulphuric acid and alcohol allowed to stand over night; 15 ounces of distillate obtained; time, 1.03; mean temp. 171° F.; finished spirit, 39° B.; sp. gr., 0.834.

No. 4. Officinal proportions; all the nitric acid added at once; distillate measured 7⅛ ounces; marked 28° B. (48° F.); sp. gr., 0.890; mean temp., 172°; time, one hour.

No. 5. Officinal proportions, but using the proper proportion of weaker acids; distillate, 8 ounces; marking, at 48° F., 29° B.; sp. gr., 0.885; time 1.30; mean temp., 170°. Finished spirit marked 39° B.; sp. gr., 0.834, at 60° F.

No. 6. Officinal proportions, but maintaining a lower temperature;* time, 2 hours; temp., between 140° and 150° F., except during a short period towards the end, when it rose to 164° F.; distillate 3¼ ounces, which being insufficient "to float the hydrometer, its specific gravity was not taken." On reapplying heat, and distilling at a temperature ranging from 140° to 180°, 2¼ ounces more of distillate was obtained; finished spirit, 39° B.; sp. gr., .834.

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* The author undertook this experiment on the strength of Mr. Diehl's suggestion, that "if the reaction takes place at a lower temperature the yield is smaller, but etherification is complete and the distillate more concentrated than at a higher temperature," etc. "Mr. Diehl" and the Reporter of this being identical persons, he may be pardoned for correcting a misconception of that portion of his paper by Mr. Goodman. By the quotation mentioned it was intended to convey the idea, that the rapid heating to the specified temperature—180°—or near it, was not necessary, inasmuch as complete etherification occurred at lower temperatures. These lower temperatures are such at which there was evident and brisk reaction, and consequently etherification, and it is nowhere mentioned that they should be as low as the temperature maintained by Mr. Goodman in his experiment. In one experiment recorded, the contents of the retort commenced to simmer at 143°; the heat was removed at 152° F., and the temperature then rose spontaneously to 165°.

No. 7. Repeated experiment 5. Distillate measured 13 ounces; time, one hour; mean temp., 168°; finished spirit, .834°.

No. 8. One and one-half times officinal quantities; all the sulphuric and two-thirds the nitric acid added at once, the remainder of the nitric acid in small quantities through a funnel tube during the course of the distillation; distillate, twenty fluid ounces, marking, at 48° F., 29° B., .885 sp. gr.

No. 9. Nitric acid (1.42), f℥iv; alcohol (.035), f℥xiij (suggested by Mr. Mill); time, 4.10; distillate, f℥vj ʒij.

No. 10. Sulphuric acid, ℥ij; nitric acid, ℥v; stronger alcohol, ℥xiij (no wire); distillate, 10¾ ounces; time, 0.39; mean temp., 163°.

No. 11. Layers of acid, water, and alcohol were allowed to react at a temperature of from 28° to 40°; the quantities are not given; after fourteen days, 1¼ ounces of ether, having a sp. gr. 0.895, and a peculiar fruit-essence odor, very different from that obtained by distillation.

No. 12. Nitric acid, f℥x; stronger alcohol, f℥xxvj; distillate, 24 ounces; time, 1.10; mean temp., 148°.

The author appears to have adopted the method of Mr. Mill for determining the quantity of crude ether in the distillate, and by shaking the distillates obtained with twice their volume of water, he obtained the following results: No. 3, 15 fl. ozs. distillate = 4½ fl. ozs. ether; No. 6, 3¼ fl. ozs. distillate = 1½ fl. ozs. ether; No. 8, 20 fl. ozs. distillate = 5 fl. ozs. ether; No. 9, 6¼ fl. ozs. distillate = 1⅝ fl. ozs. ether; No. 10, 10¾ fl. ozs. = 5½ fl. ozs. ether; No. 12, 24 fl. ozs. distillate = 12 fl. ozs. ether.

From these results it would appear that there is not that difficulty to obtain the full amount of distillate, that is pointed out in Mr. Diehl's paper, and is also referred to by Mr. Mill in his paper, and that even much larger quantities can be obtained. The author's results, as regards specific gravity, also do not agree with either Mr. Diehl's, nor the requirements of the Phar-

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In the other experiment recorded, the simmering commenced at 150°, the reaction was energetic at 160°, and, turning down the gas flame, it rose spontaneously to 168°. While the above statement may have been calculated to convey such an idea as that adopted by Mr. Goodman, it is now distinctly stated that, by "a lower temperature," it was intended to indicate such lower temperatures as had been found to cause brisk reaction, and that these, in the experiments recorded, were temperatures lying between 160° and 170° F.—C. L. D.

macopœia. His specific gravities, however, *appear to have been determined by means of a Beaumé's Hydrometer*, the correctness of which he does not state to have verified. Ibid., p. 136–141.

Sweet Spirit of Nitre.—F. M. Rimmington has communicated a paper in which he endeavors to answer "what sweet spirit of nitre was—is—and ought to be." Spiritus nitri dulcis was introduced into English pharmacy some time in the early part of the eighteenth century, and it appears in the London Pharmacopœia of 1746, the formula for its preparation being as follows:

℞. Sp. Vinosi Rect.	*M.* Libras duas.
Sp. Nitri Glauberi.	*P.* Libram dimidiam.

Misce infundendo nitri spiritum alteri, et distilla leni calore, quamdiu, quod prodit, fermentationem cum sale lixivioso non suscitat.

The spiritus vinosi here ordered is by measure; its sp. gr. 0.825; the acid by weight. The process, with these proportions is not without risk; the product is a highly ethereal fluid, of a fragrant odor, yellow color, and yielded 18–20 per cent. of nitrous ether. In the Pharm. of 1788, the process was so modified that only twenty-six fluid ounces were to be distilled; in 1809 the quantity of acid was reduced to three ounces—or one-half—and only twenty-four ounces to be distilled; in 1836 the proportions of acid and alcohol were altered to four troy ounces of the acid and three troy pounds of spirit. vini rect., sp. gr. 0.838, and the distillate was to measure thirty-two fluid ounces, and have a sp. gr. not to exceed 0.834. In the British Pharm. of 1867 the process was finally changed to its present form. This process the author considers unnecessarily complex. The direction to suspend the process after twelve fluid ounces have distilled until the retort and contents have cooled, for the introduction of the second portion of nitric acid, is quite impracticable on a larger scale, since too much time is required for the cooling when working with large quantities, and an active and destructive chemical action would all the while be in operation in the body of the retort. The Pharmacopœia, however, fulfils one duty by specifying what the preparation ought to be. The author then states that "four per cent. of nitrite of ethyl, the quantity contained in the spirit of the British Pharmacopœia, is," he thinks, "a fair standard to adopt, and contains as much ether as can, perhaps, be conveniently kept without loss." (The Br. Pr., indirectly, claims for its preparation 10 per cent. of nitrous ether.—Rep.). Ph. J. Trans., Nov. 3d, 1877, p. 341.

In a subsequent paper (Ibid., Nov. 10th, p. 362), read before the Pharm. Society, the author states that in practice, the process of the Br. Ph. does not yield a spirit of the above implied strength, although the chloride of calcium test implies this amount of ether. He does not, however, give any experimental data to prove his assertion ; the determination of ether in commercial samples, however reliably executed, being no evidence. The discussion following the reading of the author's paper, which was participated in by the President of the Society, Professors Attfield and Redwood (the originators of the present British process), and Mr. Rimmington, shows very conclusively that very little is positively known regarding the *exact* composition of spirit of nitrous ether, by whatever process it is obtained, but that the process of the Br. Pharm. gives uniform results when properly carried out. Speaking of the ethereal liquid separated when the spirit is shaken with solution of chloride of calcium, Prof. Attfield remarks that the Br. Pharm. does not imply this to be pure nitrite of ethyl, but that the compilers of the Pharmacopœia, knowing this liquid not to be wholly and solely nitrite of ethyl, designate it as "an ethereal liquid."* Professor Redwood confesses that he does not know either the exact nature of the decomposition and reaction, nor the composition of the product. It contains nitrite of ethyl, aldehyde, and probably other compounds, but in what proportion it is difficult to indicate. Nevertheless the process of the B. P. is one which will produce sweet spirit of nitre of definite composition with ease and certainty. Ibid., p. 377.

Referring to the paper of Mr. Rimmington and the discussion which it brought out, J. Williams communicates some experiments by which he has succeeded in obtaining the pure ether, both in its isolated condition and in spirituous solution. The author first prepared crude nitrous ether by passing a constant and slow current of nitrous acid, generated by acting upon such bodies as starch, copper, mercury or arsenious acid, into strong—preferably absolute—alcohol, kept as cool as possible, until the gas is no longer absorbed. The crude ether so obtained contains, besides much nitrite of ethyl, aldehyde, acid, etc. From this crude alcoholic solution the pure nitrite of ethyl is obtained without difficulty. Nitrite of ethyl is an extremely volatile liquid; it boils at 61° F., whereas aldehyde boils at 90° F., and alcohol at 180° F. Taking advantage of these facts the pure ether may, with certain precautions, be separated by distillation. The flask containing the crude product is placed in a water-bath (kept gently warm during the operation), and connected by bent tubes with several other flasks and bottles. The first tube should be passed into a small empty flask, in which most of the alcohol will condense; the second passes into a second flask containing a little water, in which any alcohol escaping condensation in the first flask is retained, together with free acid and nearly all the aldehyde; from this a third tube passes into a somewhat shallow flask, containing a strong solution of caustic potash, over which, *and not into which*, the gas is allowed to pass. In this way the last portion of aldehyde is absorbed, and the gaseous nitrite of ethyl is now passed through a chloride of calcium tube to absorb moisture, and from that into a strong dry tube surrounded by a freezing mixture (and permitting complete stoppage by sealing), or, more practically, into strong or absolute alcohol, which readily absorbs it. It is only necessary to note the weight of the alcohol used for absorbing the gas and its weight at the end of the operation to know the strength or percentage of nitrite of ethyl which must be in solution. Solutions of nitrite of ethyl made with weaker spirit soon turn acid, while those made with absolute alcohol keep a long time. It is true the very strong solutions of 50 and 25 per cent. show traces of acidity when tested with moistened litmus-paper, but the 10 per cent. solution is quite neutral. These solutions are not browned by caustic potash, even when boiled; their sp. gr. is as follows:

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* It is difficult to reconcile this statement with the following sentence, evidently the original test of the B. Ph., which occurs in "Dr. Pereira's Elements of Materia Medica and Therapeutics," abridged and adapted, etc., by Robert Bently and Theophilus Redwood (1872): "2 *per cent. of the original volume will separate in the form of* NITROUS ETHER."—REP.

At 60° F. 10 per cent.,	0.810
25 per cent.,	0.824
50 per cent.,	0.850

When treated with saturated solution of chloride of calcium, as sweet spirit of nitre is ordered to be tested in the Br. Pharm., the following results are obtained:

Strength of solution.	Volume of ether separated.
50 per cent.,	48 per cent.
25 per cent.,	23 per cent.
10 per cent.,	5 per cent.
5 per cent.,	a thin film.

Showing that the amount of ether retained in solution is larger with the weak ethereal solutions than with the stronger. In conducting this test the precaution must be observed to keep the tube constantly cooled while effecting the mixture of solution of chloride of calcium and solution of nitrite of ethyl, which should also be very gradual, since considerable heat is generated by the admixture, and, owing to the extreme volatility of the ether there is danger of loss by evaporation or that the tube may burst; and even when the operation is most carefully conducted, there is probably some loss of the volatile liquid incurred. The author uses a tube 27 inches long and about ⅜ inch diameter, sealed at one end, divided into two unequal portions, the lower having a capacity of 400 grains, while the upper has a capacity of 200 grains and is graduated into 2-grain divisions. The cooling is best accomplished by allowing cold water to run constantly over the tube; the mixing by slowly inverting the tube, from minute to minute, several times.

The author, finally, suggests that perhaps the day may come when pharmacists will be required to produce active medicines in a pure and definite form, and that then some such process as he describes may be employed for such bodies as compounds of ethyl, etc. Ph. J. Trans., Dec. 8, 1877, p. 441.

Nitro-methane, Nitro-ethane, and Nitro-pentane.—These are the names assigned by Victor Meyer to the three isomeres of methyl-nitrite, ethyl-nitrite, and amyl-nitrite, which he obtained by boiling the iodides of methyl, ethyl, or amyl with nitrate of silver, and which appear to be bodies of great pharmaceutic importance. In view of the physiological and therapeutic importance of amyl-nitrite, it might be expected that the isomeric nitro-pentane should be endowed with energetic properties. The investigations, however, of Schadow, of Strasburg, and Filehne, of Erlangen, have shown that it belongs to a class of bodies, which, so far, are rather unmanageable in the hands of physicians. It acts like picrotoxin and codeia, producing epileptiform convulsions, proceeding, not from the spinal marrow, but from the medulla oblongata. It is altogether different in its action from amyl-nitrite, and requires further study to ascertain if it can be used medicinally. Of much greater use, however, promises to be the other two compounds, namely, nitro-methane and nitro-ethane, both of which, in comparatively small doses, produce, according to Filehne, a state of insensibility against pain (analgesia or analgia). They arrest motion only in large toxic doses, and produce then a sort of paralysis which may be repeatedly induced. The diminution of sensibility progresses from the nerve-centres. If these symptoms, which so far have only been studied in animals, should also be found to occur when administered to man, the two bodies would be of extraordinary value in medical practice, as they leave the heart's action entirely unaffected. Perhaps they, or one of them, will turn out to be the long-looked-for "absolutely safe anæsthetic," or at least a narcotic which may rescue many a victim from the demon morphiomania. It is highly desirable that further careful clinical experiments on the action of nitro-methane and nitro-ethane upon neuralgia and other painful affections be instituted. Th. Husemann in Pharm. Zeit. New Rem., Aug. 1877, p. 256.

Monoethylsalicylic ether is produced, according to Christ. Göttig, when gaseous hydrochloric acid is passed into an alcoholic solution of salicylic acid, as long as it is absorbed. Upon the addition of water, an oily body separates, which is washed with carbonate of potassium solution, dried and distilled, and then constitutes the pure compound.

Diethylsalicylic ether is obtained from monoethylsalicylic ether by heating its potassium compound for several hours with an equivalent of iodide of ethyl in a sealed tube to 160° C. (=320° F.). The mass is then treated with water, when the diethylic ether is separated as an oily substance. It is colorless, has a sp. gr. of 1.1005, an odor resembling oil of wintergreen, neutral reaction, and is sparingly soluble in water. Alcohol dissolves larger quantities.

Chloroform.—A. H. Mason has contributed an interesting paper on chloroform, its composition, manufacture, application, impurities, tests, specific gravity, etc. It is either prepared from chlorinated lime and alcohol, or, more recently, from chloral; and the latter product is remarkably pure. The impurities or foreign ingredients which have been detected hitherto are alcohol in excess, aldehyde ether, hydrochloric and hypochlorous acids, and empyreumatic or chlorinated oils. Regarding the detection of these, the author offers nothing that is new. As to the sp. gr. he refers specially to the Br. Ph., which requires it to be 1.49. He agrees with previous experimenters, that this sp. gr. is too high, and that it should be lowered by the introduction of sufficient alcohol to preserve it from decomposition. Speaking from a British standpoint, he expresses the hope that the Br. Ph. will countenance the use of crude methylic alcohol in its preparation. Crude methylic alcohol contains considerable quantities of acetone, which by the reaction furnishes chloroform. This, while more difficult to purify than the chloroform prepared from ethylic alcohol, *nevertheless can be purified*, and is much cheaper. Pure methylic alcohol (prepared from methyl oxalate) does not give a drop of chloroform. Ch. and Drug., May, 1878, p. 202.

Chloroform—Simple Method of Testing.—Dr. Lueke gives the following simple method of testing the purity of chloroform: Immerse a small piece of thin white blotting-paper into the chloroform, and then let it dry in the air. As soon as all the chloroform has evaporated, the paper will not present the least smell, if the chloroform is pure. If there is any acid smell perceptible, it indicates the presence of butyric acid in the chloroform, and as a rule has the strong characteristic odor of that substance. New Rem., Aug. 1877, p. 231.

Chloroform—Presence of Amyl-alcohol.—Hermann Werner has recently observed a sample of chloroform, which, when evaporated on filtering paper, left a distinct odor of fusel oil. Subsequent experiments proved its presence beyond a doubt. He recommends the following method, pursued by him for years, for purifying commercial chloroform. The chloroform is agitated occasionally for a day with one-fourth its volume of water, is then separated from the water, and shaken occasionally for twenty-four hours with calcined carbonate of sodium. The chloroform is then decanted, subjected to distillation, and the portion passing up to 64° C. (= 147.2° F.) is separated as pure chloroform, suitable for inhalation. What passes above that temperature is dispensed for external purposes. The first portions which come over turbid, as already noticed by Rupp, will become clear if shaken with a very small quantity of calcined carbonate of sodium, and have the lowest specific gravity. Operating some time ago with five kilograms of chloroform, he fractioned the distillates and obtained the following results:

The first	908.0	had a sp. gr. of	1.487	at 18° C.	(= 64.4° F.).
Then	940.0	" "	1.488	" "	"
	960.0	" "	1.489	" "	"
	900.0	" "	1.491	" "	"
	900.0	" "	1.495	" "	"

The temperature then rose to 64° C. (=147.2° F.). Arch. Ph., June, 1878, p. 481.

Chloroform—Action of Alcoholic Potassa Solution.—According to the experiments of Dumas, chloroform is decomposed by the action of alcoholic solution of potassa into formate and chloride of potassium ($C_2HCl_3 + 4KOHO = C_2HKO_4 + 3KCl + 4HO$). Bertholet has repeated the experiment, and finds that the reaction is by no means as simple as is indicated by the equation. He finds that a portion of the chlorine fails to enter into combination with the potassa, the quantity of chloride of potassium formed corresponding to 2.44 to 2.58 equivalents instead of three equivalents. The decomposition of the chloroform, however, being complete, and the precautions against loss perfect, the author inclines to the belief that during the reaction a peculiar chlorine compound is formed, the determination of which requires further experiments. Ph. Centralh., No. 15, 1878, p. 129.

Iodoform—Test.—Iodoform, being decomposed by heat into carbon, iodine and hydriodic acid, P. Guyot proposes to test for small quantities as follows: The liquid to be examined is placed into a small flask closed with a perforated cork, carrying a glass tube bent at right angles, and the outer limb of which is rather long. At a point distant from the cork a fragment of starch is introduced. Heat being applied to the flask, vapor of water and iodoform are driven over, the latter being decomposed by heating the tube slightly in front of the outer angle, whereby a little carbon, and further on, some iodine is deposited. The latter may be sublimed along the tube, and on reaching the starch will color it blue. New Rem., July, 1878, p. 207; from Rép. de Pharm., 1877.

Bromoform—Determination of Specific Gravity.—The sp. gr. of bromoform, given in textbooks, varies materially, inasmuch as Löwig had found it to be 2.13, while Cahours gave it at 2.90

at 12° C. (= 53.6° F.). E. Schmidt has now repeated the determination of its sp. gr., employing bromoform, which boiled at 149°–150° C. (= 300.2°–302° F.), and which had been determined to be pure, and found its sp. gr. to correspond nearly to that given by Cahours, being at 14.5° C. (= 58.1° F.), 2.775. Arch. Ph., July, 1877, p. 41.

Chloral and its Hydrate.—The experiments of Berthelot show that heat is liberated in the reaction of gaseous chloral upon gaseous water, with formation of a gaseous compound. Hence a gaseous chloral hydrate really exists as distinct from a mere mixture of the two vapors. This conclusion agrees with the results obtained by Troost from the study of the tensions of dissociation. It is supported by the fact that anhydrous chloral in vapor does not combine instantaneously with water, but condenses in it at first in the form of an oil, which only dissolves gradually even on agitation, whilst the vapor of chloral hydrate, on the contrary, condenses under water in the state of crystalline hydrate, except when agitated.

L. Troost's former results on the volume-equivalent of chloral hydrate having been called in question by Mr. Wurtz, he has repeated his experiments, and arrives at the same conclusion given in his former paper (Compt. Rend. lxxxiv, p. 711), in which the volume-equivalent in question is stated = 8. Ch. News, Aug. 3d, 1877, p. 54; from Compt. Rend., July 2d, 1877.

Chloral Hydrate—Solvent Power.—T. A. Edison has found that chloral hydrate vapor is a solvent for cellulose. He found that corks upon bottles containing crystals of chloral hydrate, were completely disintegrated to the depth of 6 mm. and converted into a black semiliquid substance. Tissue-paper, when introduced into a bottle which contained crystals of chloral hydrate was partially dissolved. Ph. Central H., Dec. 27th, 1877, p. 445; from Am. Chemist.

Chloral Hydrate—Reaction with HS.—J. Kleinat has observed that when chloral hydrate is dissolved in sulphuretted hydrogen water the solution acquires a yellow color on the addition of ammonia, and gradually becomes darker, until it has the color of officinal solution of ferric chloride. Ph. Centralh., No. 2, 1878, p. 20.

Bromal.—Guyot recommends the following method for its preparation, which is more expeditious than that of Loewig. A mixture of bromide and bromate of potassium is placed into a matrass, closed with a cork carrying two tubes: the one a safety-tube, the other a delivery-tube connected with a Liebig's condenser. Alcohol, in proper proportion, is passed on the mixture, and sulphuric acid is added in small successive portions, and the matrass is heated by a suitable bath. The product passing below 80° C. (= 172° F.), is collected separately. Above that, and to 110° C. (= 230° F.), crude bromal passes over. At a still higher temperature the mass blackens, froths, and complex products are formed. The crude bromal is subjected to distillation, the portion passing above 100° C. (= 212° F.) being collected.

When sulphuric acid is added to the mixture of bromide and bromate of potassium and alcohol, bromine is liberated and the liquid acquires a red color. This color disappears when heat is applied, and a series of new products, acetic ether, bromic ether, water and a bromated aldehyde, intermediate between ordinary aldehyde and bromal, being formed. Arch. Ph., May, 1878, p. 458; from Rép. de Ph., Sept. 1877.

Butyl-chloral Hydrate—(Croton-chloral Hydrate.)—A writer in "Medical Examiner," after reviewing the therapeutic value of butyl-chloral hydrate, expresses the opinion that it will be of value when we learn accurately to discriminate the cases to which it is most adapted. With regard to its internal administration, the author observes that it may, perhaps, be given in larger doses than the drug for which it is proposed as a substitute. It is said that as a hypnotic from 20 to 45 grains may be administered at bedtime. For the purpose of producing sleep, however, he prefers ordinary chloral. In all cases it would be safer to give a smaller dose and repeat it than to charge the system with the full quantity at once. The effect of a small dose passes off frequently in about two hours, when it can be repeated if need be, with safety; or, if no effect whatever were produced, another dose could be given even earlier. An alcoholic solution is liable to undergo some change, which is said to impair its anti-neuralgic power. This is probably true of all solutions, and the author therefore advises that in all cases it be freshly prepared, and recommends the following mixture: ℞. Butyl-chloral hydrate, ʒss.; glycerin, ℥ss.; aq. destil. ad, ℥vi. M. Ph. J. Trans., July 21st, 1877, p. 45.

Nitrite of Amyl—Antagonistic Action to Chloroform.—A correspondent of the "British Medical Journal" communicates the interesting observation that in a case of syncope during the administration of chloroform, where the usual treatment was without effect and death seemed imminent, the application of some lint saturated with nitrite of amyl to the nostrils was followed almost immediately by restoration of the pulse and the subsequent recovery of the patient. Ph. Trans., Aug. 25th, 1877, p. 148.

Carbolic Acid—A New Test.—David Lindo finds that if 30 drops of a cooled mixture composed of 2 parts of conc. sulphuric acid and 1 of water by measure are added to 8 or 10 drops of an aqueous solution of carbolic acid (say 15 grains to an ounce of water) contained in a small dish, no color is observed; but, on adding 1 or 2 drops of nitric acid, a deep-brown color is immediately developed, which on agitating the vessel, quickly changes to a beautiful red. This reaction is available as a test for carbolic acid, and reciprocally for nitric acid. With certain nitrates—nitrate of silver, proto-nitrate of mercury—the reaction is far more sensitive than with nitric acid. With 8 or 10 drops of carbolic acid solution, 5 grains to the ounce of water, a very beautiful reaction is obtained with a drop or two of nitric acid. The same quantity of carbolic acid solution, 2 grains to the ounce of water, will give the colors on the addition of 2 or 3 drops of a dilute solution of nitrate of silver or of proto-nitrate of mercury, and with care even 1 drop of such solution of carbolic acid will suffice. The test can be made available by the aid of silver or mercury salt, for solution of carbolic acid of 1 grain in 10 ounces of water; but of this dilute solution at least 30 drops must be used, mixed with about 90 drops of concentrated sulphuric acid. After adding the test fluid, the dish should be left at rest for a little and then gently shaken. The brown color is rarely produced under these conditions, the final and sometimes only color observed being purple or pink. Proto-nitrate of mercury gives a very bright yellow at first, changing to brown and then to red. This yellow color is a highly sensitive reaction, and can be plainly seen in carbolic acid solutions so weak that the final pink is barely or no longer discernible. Ch. News, Oct. 5th, 1877, p. 155. See, also, Ibid., Jan. 4th, 1878, p. 2.

E. W. Davy finds now that molybdic acid in solution with sulphuric acid is also a good and delicate reagent for carbolic acid. He had previously found it excellent for the detection of ethylic alcohol. (See Poceedings, 1877, p. 275.) If a drop or two of a dilute solution of carbolic acid are brought in contact with a few drops of the molybdic solution, there is immediately produced a light yellow or yellowish-brown tint, which passing to maroon or reddish brown, soon develops a beautiful purple coloration, remaining without further change for a considerable time. A gentle heat will hasten the reaction, which is one of great delicacy, a small drop, containing one thousandth of carbolic acid, and even one seventy thousandth part of a grain, when mixed with three or four drops of molybdic solution, producing the reaction. In applying heat to hasten the reaction it should be a gentle one—not exceeding 120° to 130° F. This is the only precaution necessary to the success of the test. At 212° F. after some time the purple is changed to blue. The author draws attention to the utility of this reaction, and gives two directions how to apply it to the determination of carbolic acid in articles of food, drink, contents of the stomach, etc., and also in its admixtures as an adulterant of creasote; the latter producing a brown or reddish, but not the final purple reaction. Ph. J. Trans., June 22d, 1878, p. 1022.

A. F. Nietsch recommends a test which is dependent on the conversion of the acid into sulpho-carbolic acid, the conversion of this into the lead or barium salt, and the final determination of the lead or barium as sulphate. This test corresponds in every particular with that recommended by Schædler in 1872. (See Proceedings, 1873, p. 339.) A. J. Ph., Dec. 1877, p. 587.

Creasote—Distinction of the Different Products, so called.—There are various articles found in the market which have antiseptic properties, are soluble in alkalies, boil at 200° C. (= 392° F.), all of which, notwithstanding their various sources, bear, according to Bouchard and Gimbert, the name of creasote. The creasote most commonly in use is obtained by distilling coal tars rich in heavy oils, raising them up to 150°–210° C. (= 302°–410° F.) It is isolated by redistilling the products which have furnished phenol and begins to pass over at from 195°–210° C. (= 383°–410° F.). In reality, this creasote should be considered as impure phenol mixed with cresylol or cresylic alcohol. The properties of phenol (C_6H_6O) are well known. Those of cresylol (C_6H_8O) are nearly analogous. Creasote of coal tar can be readily detected by producing an intense violet color in a weak solution of perchloride of iron. This reaction, which belongs properly to the phenol, is not produced by creasote from wood-tar. The creasote of beech-tar, discovered by Reichenbach and studied by Hlasiwetz and Barth, is characterized by the presence of creosol, which is a diatomic phenol, homologous with guaiacol, and may be considered as homopyrocatechin or bioxytoluol (orcin). Creosol colors an aqueous solution of perchloride of iron brown. It boils at 219° C. (= 424.4° F.), is soluble in alkalies, with which it forms creosolates. Those of potash crystallize readily. Those of soda are uncrystallizable. The neutral creosolate of potassium is easily obtained by mixing a concentrated alcoholic solution of potash with the creasote dissolved in half its volume of ether. This is the form best adapted for pharmaceutic purposes.

The following table of the reactions characterizes the two kinds of creasotes:

Reagents.	Creasote of Beech (Creosol), $C_8H_{10}O_2$.	Creasote of Coal (Phenol and Cresylol), $C_6H_6O + C_7H_8O$.
Collodion.	None.	The mixture becomes gelatinous.
Ammonia.	Insoluble, hot or cold.	Insoluble cold; soluble hot; liquid clear.
Baryta water.	Solution imperfect; liquid becomes turbid on standing.	Solution clear, but after a while a slight deposit forms.
Weak potash.	Turbid, even with excess of reagent.	Solution clear.
Gtt. ij ammonia, then perchloride of iron q. s. to redissolve the precipitate; four volumes of water.	Color green; then brown.	Color blue.

New Rem., Feb. 1878, p. 45; from Gaz. Hebdom., 1877.

Creasote—Administration.—Tournier recommends cod-liver oil for masking the caustic taste of creasote and facilitating its digestion. He gives it in capsules containing 0.02 gram (⅓ grain), mixed with 0.50 gram (7½ grains) of cod-liver oil. To be given by the spoonful. This solution should be more dilute, so as to contain 1 gram of creasote to 150 grams of the oil. He also recommends a *wine of creasote*, made by dissolving 6 grams of creasote in 125 grams of alcohol, adding 400 grams of simple syrup and sufficient Malaga wine to make 1 liter. This is weaker but preferable to that made by Bouchard's formula, which contains in the same measure 13.5 grams of creasote and 30 grams of tincture of gentian, but no syrup. A. J. Ph., May, 1878, p. 259; from Rép. de Ph., 1878.

Glycerin—Uses in Pharmacy.—C. J. Biddle draws attention to the advantageous addition of glycerin to numerous pharamaceutical preparations. Many extracts, mixtures, tinctures and wines would, in the author's opinion, be improved by incorporating glycerin in the processes of their preparation. He has used it with advantage in connection with water for the extraction of wild-cherry bark for syrup, in the preparation of tincture of myrrh, and of wine of ergot. The addition of half an ounce in a pint of resinous tincture, or one ounce in the same quantity of astringent tincture, or one containing much coloring matter, is of decided advantage. A. J. Ph., Jan. 1878, p. 19.

Glycerin—Power to Retard Chemical Reaction.—H. Lange has observed that when glycerin is present in acid liquids, it greatly retards the action of the acid upon metals, etc.; as, for instance, when hydrochloric acid is caused to act on iron or zinc. Fuming hydrochloric acid may be mixed with glycerin in any desirable proportion without perceptible chemical action occurring, at least at the ordinary temperature. The author prepared for his experiments a mixture of equal volumes of syrupy glycerin and of hydrochloric acid, containing 26.1 per cent. HCl, and a mixture of equal volumes of the same acid and water. He found that a strip of paper, coated with ultramarine, was completely bleached within 30 seconds, by the mixture of acid and water, while 4 minutes were required when the mixture of acid and glycerin was used. A piece of iron wire weighing 0.4927 gram dissolved completely—with the exception of a little carbon contained in it—in 6 cc. of the watery acid in the course of 10 hours; while 0.4875 gram of iron wire, exposed to the action of 6 cc. of the glycerinated acid, was not completely dissolved in 14 days, the reaction progressing as follows: After twenty-four hours 86.2 per cent. of the wire remained undissolved; after three days 56.6 per cent.; after six days 28.8 per cent., and after fourteen days 1.3 per cent. remained undissolved. Experiments made with zinc in place of iron, or with sulphuric in place of hydrochloric acid led to, practically, the same results. The author considers it probable that the retarding of chemical reaction by means of glycerin or other indifferent bodies may permit of useful application for scientific and technical purposes. Ph. Centr. H., Sept. 27th, 1877, p. 321.

Glycerin—Transformation into Glucose?—The transformation of glycerin into glucose has been reported by C. Kosmann, and was asserted to have been accomplished by four processes, in all of which the reduction of Fehling's solution was regarded as sufficient proof of the presence of glucose. L. Liebermann has now repeated the experiments and found the reducing action due in two cases to the presence of ferrous oxide, caused by the oxidation of iron (on digesting lard or glycerin with sheet iron), or of manganous salts (resulting by treating aqueous glycerin with permanganate of potassium in *the cold*), or of chromic hydrate remaining dissolved in the glycerin; the latter was obtained by the action of solution of bichromate of potassium and sulphuric acid upon glycerin, and, subsequent neutralization with carbonate of sodium. Liebermann recommends caution in testing for glucose, since iron preparations are frequently used in medicine.

Redtenbacher has previously observed that glycerin, in contact with yeast, evolves a gas, producing at the same time metacetic acid without undergoing alcoholic fermentation. A. J. Ph., April, 1878, p. 183; from Ber. d. Deut. Ch. Ges., 1877.

Glycerin—Action on Bicarbonate of Sodium and Borax.—When a mixture of equal parts of bicarbonate and biborate of sodium is treated with water no reaction occurs; but as soon as some glycerin is added, effervescence occurs, carbonic acid is evolved, and the solution finally contains borax and carbonate of sodium. Ph. Centralh., No. 14, 1878, p. 125.

FIXED OILS.

Fixed Oils—Testing.—G. Merz states that if an adulterated oil be mixed with genuine oil of the same species as itself, streaks appear in the liquid, while if the oil under examination be genuine, then streaks do not make their appearance. Equal quantities of the oil to be tested and of a pure sample of the same oil are placed in the test-tube, which are immersed in water for a few minutes; the two oils are then mixed, and if streaks appear the sample is adulterated. The author also gives a method for testing

Olive Oil.—A drop of the oil is placed in a small cavity made by the sandblast in the centre of a glass plate, and the plate is maintained at a temperature of about 100° C. (= 212° F.) for twelve hours or so. Olive oil remains unaltered; linseed, or other drying oil, assumes the appearance of a hard gummy mass. J. Chem. Soc., Aug. 1877, p. 228; from Chem. Centr.

Oil of Sweet Almonds—Reagents for the Detection of Certain Adulterants and Substitutes.—J. D. Bieber draws attention to the fact that much of the oil of sweet almonds of commerce is adulterated, principally with the fixed oil of peach-kernels and oils of benne. He finds that most of the tests recommended for the detection of adulterants of almond oil, such as the elaidin test, etc., are not reliable for the detection of these adulterants, but that a cold mixture of equal weights of pure concentrated sulphuric acid, red fuming nitric acid, and water, is an excellent test for the adulterants named. The test is applied by agitating 5 parts of the oil with 1 part of the reagent. If the almond oil is pure a faint yellowish white liniment (emulsion? Rep.) is produced, and it is immaterial whether the oil be fresh or old, whether it be the first or second pressing, obtained by hot or cold expression, or prepared from old or fresh almonds. The oil of peach-kernels assumes immediately a peach-blossom red, which afterwards changes to a dark-orange color. Oil of benne first assumes a faint yellowish color, which afterwards becomes dirty orange red. Poppy and nut oil (from walnuts) produce a somewhat whiter liniment than does almond oil. The addition of 5 per cent. of peach-kernel or benne oil may be detected with certainty. For this purpose mixtures of almond oil and peach-kernel oil, containing the latter oil in progressive proportions of 10 per cent., are kept on hand, and are used, after the addition of the acid mixture, as a chromatic scale for the comparison of the sample being tested. For distinguishing between peach-kernel and benne oil, nitric acid, of sp. gr. 1.40, is used. With this acid, almond oil produces a pale yellow liniment; peach-kernel, immediately a red liniment; benne oil a dirty greenish yellow, afterwards reddish mixture. Poppy and nut oils produce perfectly white mixtures. Ph. Centr. H., Sept. 27th, 1877, p. 315.

Oil of Sweet Almonds.—C. E. DePuy has had occasion to examine a sample of oil of sweet almonds, in which he had observed the odor of oil of bitter almonds. His experiments prove that it was largely composed of a drying oil, and he is of the opinion that this was oil of poppy-seed, probably admixed with the oil of peach or apricot kernels, either of which would impart the odor noticed. The oil produced quite a heavy precipitate of white flocculent matter on standing; congealed at a temperature of

15° F.; had a sp. gr. 0.945; was insoluble in ether, soluble in two volumes of oil of turpentine, in an equal portion of chloroform, and in 30 volumes of boiling alcohol of sp. gr. 0.829, but was insoluble in the same liquid cold. Crystalline elaidin failed to form by the action of nitrous acid. A. J. Ph., April, 1878, p. 161.

Oil of Wild-cherry Kernels.—Herman Betz states that for several years the kernels of the wild cherry, inclosed in the shell or endocarp, have appeared in quantities in the market, at such a price as to induce manufacturers to express the oil, which may find a use in medicine or the arts. The ground kernels are expressed by hydraulic pressure of about 2000 pounds to the square inch, and yield about 5 per cent. of a dark-green oil, which, notwithstanding the care used to avoid all dampness of the powder, has a slight odor of bitter almonds; the taste is sweetish, agreeable; sp. gr. 0.906; solidifies at 15° F.; insoluble in alcohol, but freely soluble in ether, chloroform, oil of turpentine, olive oil, and benzin. Its color is not extracted by water or alcohol, hot or cold. Its boiling-point is above that of mercury; it then takes fire and burns with a yellow flame. This high boiling-point, together with its slight bitter almond odor, are characteristic. It may be distinguished from oil of laurel by shaking with alcohol, which removes the color of the latter oil; from linseed oil by becoming solid at a much higher temperature. A. J. Ph., March, 1878, p. 111.

Olive Oil—Test for the Presence of Copper.—Ordinary olive oil is not unfrequently colored artificially. C. Cailletet recommends that 10 cc. of the oil be shaken with a solution of 0.1 pyrogallic acid in 5 cc. of ether. If the color is due to copper, this is evidenced by a brown coloration. Ph. Centr. H., Nov. 15, 1877, p. 387.

Oil of Hempseed.—H. Betz states that hempseed of good commercial quality will yield, by hydraulic pressure of 2000 lbs. to the square inch, from 15 to 18 per cent. of fixed oil; according to some statements 24 to 30 per cent. can be obtained. The oil has a peculiar hemp odor, a sweetish, mild, oleaginous taste, deep green color, and if held before a flame shows the complementary hue, scarlet if the column is fifteen-sixteenths of an inch in diameter, red, yellow, green, yellow, and finally yellowish-green, as the diameter of the column is decreased, the latter shade being obtained with a column of eight-sixteenth inch in diameter, while at six-sixteenth and below the dichroism is not evident. The sp. gr. of the oil is 0.9319, it boils at 550° F., and from 180° F. gives off very disagreeable and irritating fumes. At 5° F. it acquires a thick, honey-like consistence. Proximately, it consists of a large proportion of olein and a rather small proportion of stearin; its color is not extracted by cold or boiling water or alcohol. It is insoluble in alcohol, but freely dissolved by benzin, oil of turpentine, ether, and olive oil. It is saponifiable into a deep green, homogeneous soap by potash, and into a lighter green, more flaky soap by soda. A. J. Ph., Jan. 1877, p. 26.

Castor Oil.—The distillation of castor oil when carried on under pressure diminished by the action of the water air-pump, yields at first about one-third of its volume of an oily liquid, nearly one-half of which is *œnanthol.* On continuing the heat, the thermometer rises more than 100° C. (= 180° F.), and a crystallizing body is obtained, which appears to belong to the oleic acid group, and to have the composition $C_{11}H_{20}O_2$. A. J. Ph., April, 1878, p. 182; from Ber. d. Deut. Ch. Ges., 1877.

Ricinoleic Acid—Conversion into Stearic Acid.—A. Claus has found that ricinoleic acid may be converted into stearic acid. The ricinoleic acid is shaken with water, so as to form an emulsion, and phosphorus and iodine are gradually added to this on a water-bath, whereby a yellowish or yellowish-brown oil, heavier than water, is obtained, the formula of which is $C_{18}H_{33}JO_2$ ($O = 16$). On heating this acid, which the author proposes to name *iodostearidinic acid*, with zinc and hydrochloric acid, stearic acid is readily obtained. Iodostearidinic acid can take up two atoms of bromine, forming the compound $C_{18}H_{33}Br_2JO_2$ ($O = 16$). The author prepares pure ricinoleic acid by fractional precipitation of crude ricinoleic soap with chloride of calcium. The first third of the precipitate is rejected, and the remainder, crystallized from alcohol, consists of pure ricinoleate of calcium. J. Chem. Soc., Sept. 1877; p. 314; from Ber. d. Deut. Ch. Ges.

Croton Oil.—The late Mr. Warrington had made a series of experiments from which he concluded that the solubility of croton oil in alcohol increased with its age, or that of the seeds prior to expression. A similar opinion, based upon experiments made by himself and also by Prof. Redwood, had previously been expressed by Dr. Pereira. Harold Senier has now made some experiments which appear to fully support this opinion. By shaking 10 cc. of the oil with 50 cc. of alcohol in a graduated cc. tube, the tube being well closed with a rubber stopper, and allowing the tube to stand at rest for 12 to 24 hours, the amount of oil dissolved was read off, in the instance of five samples so treated, as follows: No. 1, freshly expressed, 20 per cent.; No. 2, 3 months old, 40 per cent.; No. 3, 3 years old, 55 per cent.; No. 4, more than 3 years old, 60 per cent.; No. 5, commercial sample of guaranteed purity, 35 per cent. was dissolved. These results, however, while interesting in themselves, led to the far more interesting observation that the undissolved oil was entirely inactive, while the alcoholic solution left upon evaporation an oil of exceeding activity. By suitable treatment he obtained a larger quantity of this active oil (soluble in alcohol) from the commercial sample No. 5. This was viscid at ordinary temperatures, reddish brown, with a slight fluorescence, and slightly turbid, owing to the suspension of acicular crystals, which are soluble on slightly warming the oil. At 50° F. the oil is too viscid to flow, and at 32° F. it becomes of the consistence of butter. At 60° F. it has the sp. gr. 0.987. The oil insoluble in rectified spirit at ordinary temperatures is light yellow, not fluorescent, has a slight odor, is quite clear, begins to thicken at 16° F., and has a sp. gr. at 60° F. of 0.924. From these experiments the author concludes that for medicinal purposes an oil extracted by alcohol would be more satisfactory than the crude oil. The author is not prepared to say whether age increases the gross activity of the oil, as it increases the soluble portion, but he is engaged in investigation upon this and other points. Ph. J. Trans., March 9th, 1878, p. 705.

E. Schmidt and J. Berendes have recently determined that the *tiglinic acid*, which Geuther and Frœhlich had found in the mother liquor of croton oil soap, along with acetic, butyric and valerianic acid, to be identical with the *methyl-crotonic acid* obtained by Frankland and Duppa. Schlippe had previously determined, besides stearic, palmitic, laurinic, and myristic acids, also crotonic, angelic, and oleic acids. Ph. Centr., Sept. 20th, 1877, p. 307.

Heron's Fat.—X. Landerer states that the fat from the neck of several species of heron (Ardea cinerea, egretta, etc.), is a popular remedy with the Greeks and Turks, being used as an embrocation against whooping cough and scrofulous swellings. The beautiful, and, in many countries, so highly-prized plumage of these birds is thrown away, and thus a source of income neglected. A. J. Ph., April, 1878, p. 173.

Piney tallow—Chemical Examination.—This fat, the product of the boiling with water of the fruits of *Vateria indica,* has been subjected to chemical examination by H. Dalsie. It is yellowish green, melts at 30° C. (= 86° F.), has a sp. gr. of 0.91, reacts acid, is readily saponified, and is composed of the free fatty acid; palmitic (75 per cent.) and elaic (25 per cent.). Sulphurous acid and other agents proposed for bleaching fats do not change this fat; chlorine produces a change in the constitution of the fat. When boiled for a short time with nitrate of potash solution, to which sulphuric acid has been added, it is bleached. It may also be bleached by exposure, in thin layers, to the sun. Candles made from this fat burn better than those made of tallow, and do not disseminate an unpleasant odor when they are extinguished. Zeitschr. Œst. A. Ver., Dec. 10th, 1877, p. 574.

Beeswax—Testing for Resin.—E. Schmidt recommends a modification of Donath's method (1872), as follows: Five grams of the wax are heated in a flask with 20 to 25 grams of crude nitric acid, sp. gr. 1.32, and boiled for one minute. An equal volume of cold water is now added, and, with constant agitation, an excess of ammonia; the liquid is separated from the wax, and poured into a glass cylinder; it has a yellow color if the wax was pure, and a more or less intense red brown if resin was present. One per cent. of the latter may thus be readily detected, particularly if the resulting color is compared with that produced by pure wax. Nitric acid acts much more energetically upon resin than upon wax. A. J. Ph., Sept. 1877, p. 445; from Ber. Chem. Ges., 1877.

CARBO-HYDRATES.

Parchment-paper.—A writer in "Polytech. Review" draws attention to the importance of parchment-paper, the admirable qualities of which have only of late begun to attract attention. By one of the simplest manipulations, the mere momentary immersion of unsized paper in strong sulphuric acid, and afterwards washing it thoroughly with water, this curious metamorphosis into a parchment-like substance is brought about. This observation appears to have been first made in 1847, by J. A. Poumarede and L. Fiquier, but the process of its manufacture—now a thriving industry—was perfected by W. E. Gaine in 1857

Parchment-paper has come to be almost indispensable for a great variety of general uses, as well as in technical and pharmaceutical chemistry, inasmuch as it affords an admirable substitute for the ordinary parchment and other animal membranes, while in point of cleanliness and cheapness it surpasses it. Plunged into water, it becomes soft and pliable. It is not injuriously affected by boiling water, regaining its original condition on drying. It is quite impervious to water, alcoholic and ethereal fluids, benzol and numerous other substances, and consequently is largely used to replace the animal membrances in sealing vessels containing them. It has been used with success as a complete substitute for animal bladder in the preparation of the well-known pea-sausage of the German commissariat; is recommended as a substitute for rubber for numerous purposes in hospitals, and, most important to the industrial chemist and pharmacist, has been found to perfectly answer the purpose of parchment in the process of separating mixtures of various substances by the method of analysis known as dialysis. It is safe to predict that its utility has by no means been yet exhausted. A. J. Ph., Sept. 1877, p. 450.

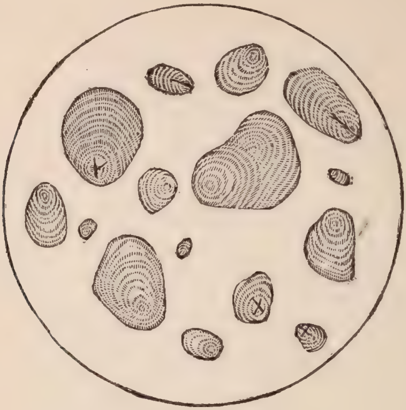
Parchment-paper—Preparation.—The application of the process of dialysis to various industrial processes, makes it desirable that the process of preparing parchment-paper, suitable for this purpose, should be well understood. It is well known that the conversion of paper into a parchment-like substance is due to the solvent action of sulphuric acid upon ligneous fibre, which, if the action is continued, will be eventually converted into glucose. For the successful production of parchment-paper, the sulphuric acid must have a sp. gr. corresponding to 59° to 60° B.; such an acid being obtained when two volumes of acid of 66° B. are added gradually to one volume of water. During the operation of parchmentizing paper the acid becomes weaker, partly owing to moisture in the paper, but mainly owing to the large surface of acid exposed to the moist atmosphere. It is, therefore, necessary to test the acid, from time to time, and to restore it to a strength of 59° B. The paper must be selected according to the eventual use that is to be made of the product. It has been observed that cotton and linen-fibre are not converted with the same rapidity. In a paper composed of cotton and linen fibre, the unchanged linen fibre can be readily distinguished, whilst the cotton fibre has become a transparent and homogeneous mass. For this reason pure cotton-paper forms a more membrane-like paper, but when dry is also more brittle; and by judicious admixture of the paper material the manufacturer can thus impart to his paper greater flexibility or brittleness, according to the purpose for which it is intended. Mineral and coloring matter interfere with the proper action of the acid. The strength of the paper also depends on the purpose to which the product is to be applied. If complete parchmentization is desired, it must be of such strength only that when placed upon the surface of the acid, this will completely permeate it. If it is too thick, the acid cannot penetrate completely, and the resulting parchment-paper will be composed of two parchmentized layers, and an intermediate layer of unchanged vegetable fibre.

The parchmentizing process is conducted as follows: The paper is drawn evenly through the acid in such manner that it shall be exposed to its action for five, ten, or fifteen seconds; from the acid it is passed directly into a vessel containing fresh (flowing ? Rep.) water, in which it is deprived of the greater part of acid; it is then passed into a second bath, in which it is subjected to the action of alkali (ammonia, carbonate of sodium, etc.), and is then completely freed from the neutralizing agents by passing it through a third bath containing pure water. The temperature for parchmentizing should not exceed 14° C. (= 57.2° F.); the acid will parchmentize between 16° and 20° C. (= 60.8° and 68° F.), but the action is too rapid, and there is not sufficient time to draw the paper through the acid. Ph. Centr. H., Sept. 27th, 1877, p. 3.

Detection of Cotton Fibre in Linen.—The fabric is well washed, dipped into an alcoholic solution of rosolic acid, known in commerce as aurin or yellow corallin, afterwards immersed in a concentrated aqueous solution of carbonate of sodium and finally washed; the linen fibre is dyed rose red by this treatment, while cotton remains white. A. J. Ph., May, 1878, p. 260; from Phar. Zeit.

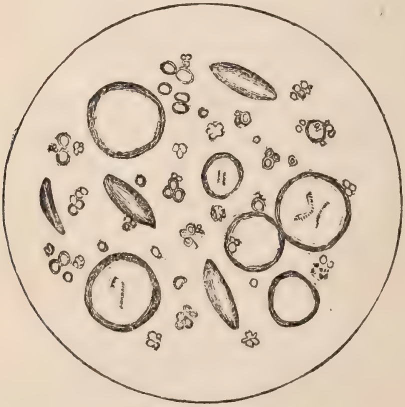
Starches—Detection of Adulterations by means of the Microscope.—Louisa M. Reed has contributed to "New Rem." (March, 1878, p. 72), an interesting paper on "How to Detect Adulterations by means of the Microscope," in which some excellent descriptions of various starches, illustrated by cuts, are given. *Potato-starch* (Fig. 70) has been so frequently described, that the description given may be omitted. *Arrowroot*-starch closely resembles potato-starch, but the grains are much more uniform in size, and are about $\frac{1}{800}$th of an inch in length. The nucleus is generally in the larger end of the grain, while in the potato-starch it is in the smaller end; thirty or forty rings can frequently be counted in one grain of arrowroot-starch, while that of the potato sometimes has only three or four. *Wheat-starch* (Fig. 71) consists of two distinct kinds of granules; small spherical or angular grains floating frequently in a mass, many times more

FIG. 70.



Potato-starch.

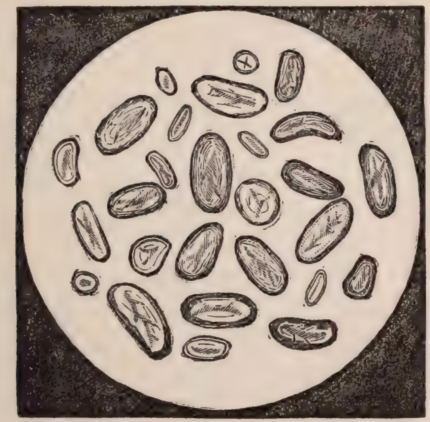
FIG. 71.



Wheat-starch.

numerous than the large grains, and about $\frac{1}{5000}$th inch in diameter. The others are large, lenticular grains, which, when viewed on the face, appear like a spherical grain. When viewed on the edge, they have the appearance of a double-convex lens. The large grains in their normal state are very uniform in size for the same variety, but starch grains of the different varieties differ considerably in size. The average diameter of the grain in eight varieties examined was by very careful measurements found to be $\frac{1}{987}$th inch. When subjected to dry heat, the grains become larger, brittle, and more transparent, yet they can generally be identified when subjected to either dry or moist heat, if the latter be not raised to the boiling-point. *Barley* and *rye-starch* are closely related to *wheat-starch.* In the barley-starch the large grains are smaller ($\frac{1}{1600}$th inch) in diameter than those of wheat, while the small grains, besides being smaller ($\frac{1}{8800}$th inch) are more angular, and frequently have a nucleus. The large rye-starch-granules are larger ($\frac{1}{727}$th inch), the small granules are smaller ($\frac{1}{5717}$th inch) than those of wheat. A distinct cross is seen in rye-starch with polarized light. *Bean*-starch (Fig. 72) has a very different appearance from that of any other starch, except that of the pea. The granules are regularly oval and quite uniform in size. A dark line with ragged edges generally extends the whole length of the grain, cross-marks being frequently seen. Faint rings are seen near the edge of the grain.

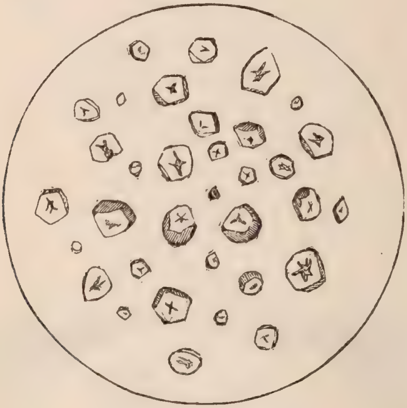
FIG. 72.



Bean-starch.

The grains average about $\frac{1}{647}$th inch in length and $\frac{1}{1000}$th inch in breadth. Dry heat renders the grains more brittle, and destroys the nucleus, but not the rings. Moist heat expands, distorts, renders more transparent, and destroys both rings and nucleus. *Pea-starch* is nearest like that of beans. The grains are smaller and more slender; being generally less than $\frac{1}{700}$th inch in length. *Corn-starch* (Fig. 73) presents angular grains, which have no rings, and presents a round or star-shaped nucleus. The average grain is $\frac{1}{6000}$th inch in diameter. The shape is but little changed by dry heat, but entirely destroyed by moist heat. The grains found in the central or outer part of the kernel of corn are more angular than those found in the inner part. *Rice-starch* (Fig. 74) resembles that of corn very closely. The granules are much smaller, however; being only $\frac{1}{6350}$th inch in diameter. They are angular, being bound by plane sides only, are without rings, and have a central nucleus, which is either a dot, a line, or star-shaped. The granules are aggregated together in angular or very irregular-shaped masses. *Oat-starch* (Fig. 75) is nearest like that of rice, and it is quite difficult to distinguish between them. It is both compound and simple. The compound grains or masses are oval, spherical, or egg-shaped; the surface of the masses being smooth, while those of rice are irregular. The divisions into grainlets show very distinctly. The simple grainlets are larger than those of rice, being $\frac{1}{4080}$th inch in diameter, and bounded

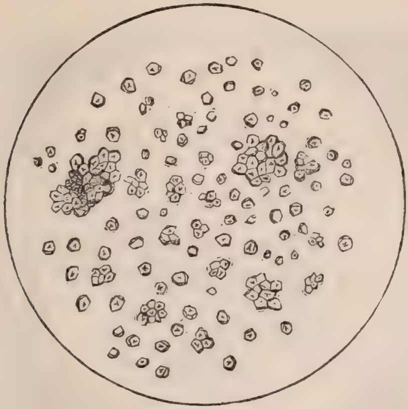
FIG. 73.



Corn-starch.

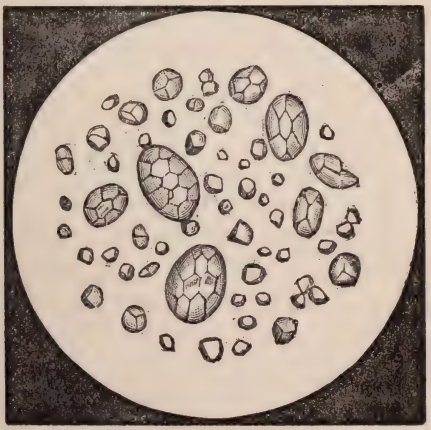
by one or two curved surfaces. They are without nucleus or rings. A faint cross is seen with polarized light. *Buckwheat-starch* (Fig. 76) very closely resembles that of rice and oats, and is made up both of compound and simple grains. The compound masses are cylindrical or prismatic. When cylindrical, the curving surface is perfectly smooth, but the ends are irregular as though they had been broken. These masses are very numerous and characteristic, and somewhat resemble the cell-contents of black

FIG. 74.



Rice-starch.

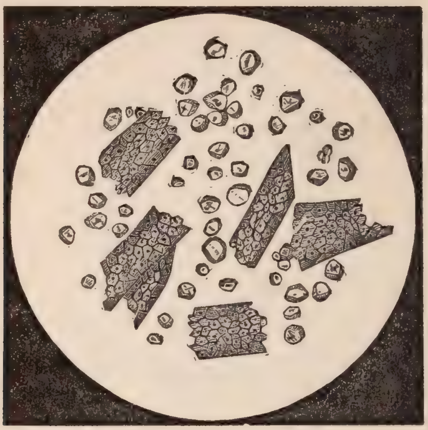
FIG. 75.



Oat-starch.

pepper, being coarser, however, than the latter. The granules are like those of rice, in having a central nucleus and no rings, and are like those of oat, in having one or more curved faces. In size they are but $\frac{1}{3000}$th of an inch in diameter. After a description of *Sago* and *Tapioca-starch*, a description of *Turmeric-starch* (Fig. 77) is given. The starch-grains are quite uniform in size, and in shape are elliptical, oval, or like flattened disks, sometimes even truncated. The nucleus is at one extremity, and has the appearance of being entirely outside of the grain proper. Rings quite distinct, numerous, and uniform in density, pass around the granules like zones, and present a beautiful appearance in a fresh granule. Commercial turmeric has been heated so much in preparation for market that frequently the rings cannot be seen, and even the normal shape of the grain is lost. In the fresh state they show a decided cross or black bands with the polarized light, but this is seldom seen with the commercial turmeric. The coloring matter is a deep reddish yellow, and is contained principally in special cells of the parenchyma. The starch-grains are perfectly white, and give the usual reaction of iodine and potassa; but sulphuric and sulpho-chromic acids are perhaps of more value in this case, for they turn the coloring matter to a peculiar rose pink. *Ginger-starch* granules closely resemble those of turmeric.

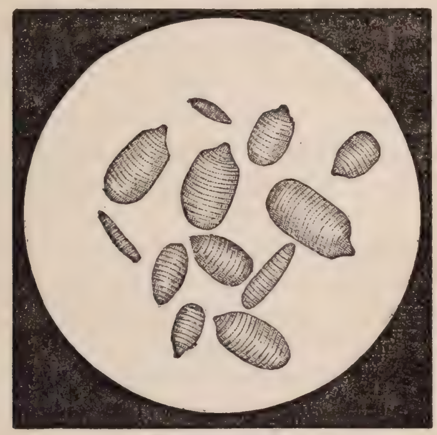
FIG. 76.



Buckwheat-starch.

Starch—Utilization of Residues of its Manufacture.—In the manufacture of starch from wheat, the grain is, as is well known, first soaked in water until it becomes softened sufficiently to be readily mashed. The water is then drawn off, and the grain is subjected to further treatment. Dr. G. Thenius has now examined this water, and found it to contain 2.09 per cent. of an extract, which he obtained in the form of a thick syrup of light-brown color. This syrup has an odor resembling *extract of malt*, and a sweetish saline taste. A portion of the saline constituents remain as a sediment when the extract is dissolved in twice its quantity of distilled water, and the clear filtrate will then, on evaporation, yield an extract, which has a pleasant sweetish, no longer salty taste. 100 parts of the (crude?) extract contain 25.6 per cent. of salts (chiefly composed of sulphates, phosphates, and chlorides of sodium, potassium, and magnesium), and 74.4 per cent. of pure extract. The latter may be obtained in large quantities by evaporating the liquor in shallow vessels by means of waste steam, and may be used either as food for cattle or it may be baked into bread. The latter has a pleasant taste, and keeps moist for some time. Experiments have also been made with it, with good results, as a substitute for extract of malt. Ph. Centralh., No. 21, 1878, p. 198.

FIG. 77.



Curcumæ-starch.

Iodide of Starch.—According to Bondonneau, iodide of starch is a definite compound, its composition being represented by the formula $C_{12}H_{10}O_{10},3I$. It is decomposed with the regeneration of the original starch, by all sources of hydrogen, and is again produced by the limited action of oxidizing agents in the cold, even by the mere action of the atmosphere. Except when present in excess, iodine is not eliminated by its solvents, such as iodide of potassium, benzol, bisulphide of carbon, etc., except by alcohol, whilst these solvents separate it from the red compound which it forms with dextrin *a*. If kept suspended in water for a year it is slightly decomposed; a portion becomes soluble in water, which then contains dextrin *a*, colored red by iodine, and hydriodic acid, but no glucose. The insoluble portion retains the same composition. Ch. News, Oct. 26th, 1877, p. 195; from Comp. Rend., Oct. 8th, 1877.

Gum Arabic—Purification.—According to A. Vogel the instability of mucilage of gum arabic is due to the presence of a protein body which is removable by alcohol. A mucilage is prepared, precipitated by alcohol, expressed, and dried. The purified gum arabic so obtained affords a mucilage which, in the author's experience, will keep for a long time perfectly unchanged. The alcoholic washing leaves, on evaporation, a gummy nitrogenous mass. Schweiz. Wochenschr. f. Ph., June 28th, 1878, p. 227.

Cane-Sugar—Analysis of Ash.—Dr. Wallace has analyzed the ash of a sample of cane-sugar, the ash being in unusually large proportion (1.38 per cent.). It is understood that the canes from which the sugar was made were grown near the seacoast in Demerara, on the adjacent Dutch colony, and that the cane-juice was treated with lime only. The following is the result: Potash, 29.10; soda, 1.94; lime, 15.10; magnesia, 3.76; sulphuric anhydride, 23.75; phosphoric anhydride, 5.59; carbonic anhydride, 4.06; chlorine, 4.15; peroxide of iron, 0.55; alumina, 0.65; silica, 12.36—total 101.03—less O = Cl 0.93 = 100.10. Ch. News, Feb. 22d, 1878, p. 76.

Cane and Beet-root Sugar—Analysis of Ash.—J. W. McDonald reports the result of analysis of the ashes of cane and beet-root sugars, which had collected in his laboratory during a year's analyses. They therefore represent an average composition. The high percentage of lime, magnesia, iron, and sand in the ash of cane sugars, is due to imperfect modes of preparation in the West Indies as compared with those practiced in beet-root sugar manufacture.

	Cane Ash.	Beet Ash.
Potash,	28.79	34 19
Soda,	0 87	11.12
Lime,	8 83	3.60
Magnesia,	2 73	0.16
Ferric oxide and alumina,	6.90	0.28
Sulphuric anhydride,	43.65	48.85
Sand and silica,	8.29	1.78

Chem. News, March 29th, 1878, p. 127.

Sugar—Solubility in Water.—H. Courtonne confirms the results, previously obtained by Berthelot and Scheibler, that 100 grams of water dissolve at 12.5° C. (= 54.5° F.) 198 647, and at 45° C. (= 113° F.) 245 grams of sugar. A solution, therefore, saturated at 12.5° C. contains 66.5, and when saturated at 45° C., 71 per cent. of sugar. A. J. Ph., May, 1878, p. 255; from Compt. Rend., 1877.

Sugar—Recovery of Crystallizable Sugar from Beet-root Molasses by Osmosis.—It is well known that numerous and costly experiments have been made, with a view to separating the last portions of crystallizable sugar from beet-root molasses, and that all methods hitherto proposed have failed to accomplish this object. Mathée and Scheibler, however, now claim that this separation can be accomplished by the process of dialysis. The apparatus which they have constructed for this purpose is described as resembling in its general form the filter presses employed in refineries for the filtration of the sugar juices. The description is not very clear, but the arrangement appears to be as follows: A large series of wooden frames are arranged in sets of two; a sheet of parchment-paper being interposed between the two frames, which are fastened together by suitable means. One of these frames constitutes the receptacle for the molasses, the other for water, and each is provided with suitable openings for the admission and exit of the respective liquids, which are caused to circulate separately through the entire series of frames. The molasses is suitably diluted before subjecting it to dialysis. After twenty-four hours the apparatus must be cleaned. The method has been applied in several beet-sugar factories, and its practical value will therefore be determined at an early date. Ph. Centr. H., Sept. 27th, 1877, p. 316.

Sugar—The Leaves of the Sugar Beet a Source.—J. Pierre communicates to "L'Union Pharm." (July, 1877) some interesting experiments, by which he has determined that the leaves of the sugar beet contain sugar in such quantities, that they may find utilization as a source for alcohol. He had collected in the month of November, in Caen, 158 kilograms of leaves from such plants which, during their growth, were not partially deprived of leaves; these were pulped and expressed, and yielded 35 liters of juice, which, on fermentation with beer-yeast, at 20° to 22° C. (= 68° to 71.6° F.), and distillation, yielded a distillate containing 0.198 liter of absolute alcohol. As the leaves contain $\frac{9}{10}$ juice, the author calculates that the leaves from a hectare of beets will yield 170 liters of alcohol, corresponding to 350 kilograms of sugar.

The author furthermore maintains, that the falling off of the leaves during the growth of the beets must have a detrimental influence on the formation of sugar in the beets. He assumes that the sugar is formed in the leaves and is stored in the roots, while the formation of new leaves, after the falling off of those first formed, consumes a portion of the sugar already stored. To prove this view to be correct, however, careful and extensive experiments are required. Schweiz. Wochschr. f. Ph., Aug. 24th, 1877, p. 273.

Sugar—Presence in the Petals of Various Flowers.—J. Boussingault has determined the quantity of sugar in the petals of various flowers, which he finds to be quite large. Thus rose petals yielded 3.4 per cent. of glucose; petals of Nerium Oleander 7.22 per cent.; Robinia viscosa 1.46 per cent.; Magnolia (species) 1.44 per cent.; citrus aurantium 5.00 per cent. Besides glucose, Robinia viscosa contained 1.13 per cent., magnolia (species) 0.55 per cent., and citrus aurantium 0.60 per cent. of saccharose. When the flower petals are exposed to air, while still in a moist condition, they lose a portion of their sugar; like all parts of plants which are not green, they absorb oxygen and give off carbonic acid. Ph. Centr. H., Oct. 11th, 1877, p. 339.

Cane Juice—Presence of Aconitic Acid.—According to Arno Behr, the juice of the sugar-cane contains *aconitic acid.* It was obtained from the preserved juice and from crude sugar, from the latter to the amount of 0.149 per cent. Some Cuban sugars separated from their aqueous solutions minute crystals of aconitate of calcium. Pure aconitic acid, obtained from this source and from citric acid, was found to fuse at 187° to 188° C. (= 368.6° to 370.4° F.); the lower fusing-point usually given is due to impurities. The author found also oxalic acid in the precipitate, obtained by dissolving crude sugar in a little water, and mixing the solution with alcohol. A. J. Ph., Aug. 1877, p. 402; from Ber. d. Deut. Chem. Ges., 1866.

Commercial Sugars and Syrups—Examination.—Prof. Albert B. Prescott reports the result of the examination of a number of samples of sugar and syrup, which had been submitted by Mr. L. Rossiter for such examination, in the belief that they contained poisonous impurities, resulting from the use of chemicals in their manufacture. Special qualitative examinations for *lead* and *arsenic* were made, by methods of known accuracy, by J. S. Johnson and S. E. Parkhill, but neither the one nor the other poisonous agent was detected. The experimenters also made quantitative determinations of the *total ash*, of *glucose* (lævulose and dextrose), and of *water*, and they determined the *specific gravity* of the syrups, the following being the result:

	Glucose. Per cent.	Ash. Per cent.	Water. Per cent.	Sp. Grav. Per cent.
Sugars—No. 1,		0.001	1.4	
2,	2.5	0.363	1.9	
3,	5.0	0.140	0.9	
4,		0.015	0.1	
5,	6.7	0.670	1.4	
6,		0.039	0.2	
7,	0.1	0.028	0.3	
8,	1.4	0.111	1.6	
9,	0.3	1.010	0.1	
10,	trace	0.144	0.1	
Syrups—No. 1,	31.3	3.295	20.0	1.405
2,	42.1	0.876	18.0	1.418
3,	33.6	2.700	21.0	1.403
4,	22.7	2.900	25.0	1.392

The ash, by ordinary systematic qualitative analysis, revealed no other constituents than sodium, potassium, calcium, magnesium, aluminium, and iron compounds and sulphates, chlorides, carbonates, and silica. The ash of syrup No. 1 consisted of calcium sulphate, aluminium and iron oxide, and sodium and potassium chloride. Syrups No. 3 and 4 contained magnesium carbonate. A. J. Ph., Oct. 1877, p. 487.

Sugar—Presence of Ultramarine.—Ballaud draws attention to the circumstance that some sugar refiners add a certain proportion of ultramarine to loaf sugar, whereby its yellowish color—

caused by incomplete refining—is masked. The quantity of ultramarine added, it is true, is quite small, but it is sufficient to impregnate syrups containing free acids, fruit syrup, etc., with sulphuretted hydrogen, and thus to impart to them a disagreeable taste. Its presence is readily detected by dissolving the sugar in 20 p. of distilled water, when, on standing about twenty-four hours, a slight blue deposit is formed.* Zeitschr. Œst. Ap. Ver., July 1st, 1877, p. 308; from J. de Ph. et de Chim.

Edward W. Runyon reports examinations of several brands of A No. 1 sugars of New York, which lead him to precisely similar results and remarks as in the above. A. J. Pharm., Dec. 1877, p. 586.

Sugar in Pharmacy.—Charles Symes draws attention to the importance of using pure sugar in the galenical products of pharmacy, and recommends to his British brethren the products of Say, of Tate & Son (formerly Finzel), and the granulated sugar of the Eastern Sugar Refinery, Boston, as specially suitable. Regarding the product of Say, which appears to be made (on the Continent) exclusively from beet-juice at certain periods of the year, he says that it is regarded in the sugar trade as a standard of purity; the prejudice against beet-root sugar is, therefore, not well founded, and should rather be applied to imperfectly purified products from that source. Some practical remarks on the making, preservation, and dispensing of syrups, are also made. Regarding the influence of acids upon solutions of saccharose the author observes that some acids have the power of inverting the latter to a greater extent than others, as pointed out by Arno Behr, in 1874, and he reproduces that author's table showing the relative power of inverting saccharose possessed by various acids at various temperatures, which may also find a place here. The action of hydrochloric acid is taken as the standard at 100. It will be seen that acetic acid has the least, nitric acid the greatest inverting power, and that phosphoric acid stands high in the scale.

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* The above observation is true for many samples of American loaf as well as granulated sugars.—Rep.

Inverting Power of Acids on Saccharose (Arno Behr).

Acid.	211 hours. 13°–17° C. (= 55.4°–62.6° F.).	115 hours. 19°–27° C. (= 66.2°–80.6° F.).	78 hours. 25°–27° C. (= 77°–80.6° F.).
Acetic,	1.2	1.3	1.6
Butyric,		1.9	2.5
Isobutyric,		2.2	2.5
Succinic,		3.5	4.0
Malic,		8.1	8.8
Citric,	8.2	9.2	10.2
Formic,		9.2	9.6
Lactic,	10.2	10.4	9.9
Tartaric,	11.4	13.4	13.8
Phosphoric,	24.2	25.8	26.9
Oxalic,	49.6	53.1	54.5
Sulphuric,	83.9	83.1	84.2
Hydrochloric,	100.0	100.0	100.0
Nitric,	100.1	100.4	100.1

Yearbook of Ph., 1877, p. 532–536.

Brown Sugar—Transformation of Crystallizable into Inactive Sugar.—Recent observations have shown that the reduced glucose in brown sugar is inactive to polarized light. This glucose varying in quantity in different sugars, it appeared interesting to find whether it varied in the same samples at different times, and experiments made by W. Gayon show that it does, there being at the same time a loss of crystallizable sugar. This conversion of crystallizable into uncrystallizable sugar is greater during the summer than during the spring, being, therefore, augmented by heat; while moisture also favors the change. The importance of these facts upon the package and transport of moist sugars is evident. J. Chem. Soc., Sept. 1877, p. 303; from Compt. Rend., vol. 84.

Saccharification of Grain.—During the past few years a new method of saccharification has been adopted in a number of distilleries, particularly in Russia and Central Germany, whereby the yield is said to be materially increased. This consists in the employment of a weak solution of sulphurous acid before allowing the diastase to exercise its particular function. Hémilian and Melnikoff have now made a series of experiments with a view to determine the relation of the sulphurous acid to the substances that yield alcohol. They found that while sulphurous, as well as other acids, when employed even in the smallest quantities, reduce the ability of diastase to convert starch into sugar, this retarding action of the sulphurous acid is more than compensated by the circumstance that the starch is rendered more susceptible to the action of the diastase. It is probable that the sulphurous acid dissolves the gluten and the other albuminoids which envelop the starch-granules, and this favors the immediate contact of these granules with the diastase and their complete conversion into glucose. Based upon their observations, the author recommends the following application of the new method:

The ground grain, without the malt, is macerated for 5 or 6 hours in a cold solution containing sulphurous acid amounting to 0.1 to 0.13 per cent. of the grain, after which the mass is heated to 50° C. (= 122° F.), in order to drive off excess of sulphurous acid. The malt is then stirred into the mixture, the temperature of which is gradually raised to 70°–75° C. (= 158°–167° F.), the ordinary saccharifying temperature, and the further operation is then conducted as under ordinary circumstances. The compounds formed by the sulphurous acid do not in any way interfere with the subsequent fermentation of the mash, although they give rise to the elimination of a little sulphuretted hydrogen and the formation of certain sulphur compounds, which remain to be examined. It is important also that much less free acids are formed during the fermentation of the mash containing sulphur compounds than are formed under ordinary conditions. This not only increases the yield of alcohol, but the slops produced being less acid, are also valuable and suitable as food. Arch. Ph., July, 1877, p. 83.

Dextrin Maltose (*Starch Sugar*)—*Preparation.*—G. Valentin communicates a method whereby the utmost quantity of starch is converted into glucose at a comparatively small cost and with great regularity. As applied to rice the process is as follows: The finely ground rice is mashed with one and a half times its weight of cold acidulated water, or acidulated water at a temperature not exceeding 40° C. (= 104° F.), the mash being well stirred by mechanical appliances. The mash so produced is now allowed to flow slowly into boiling acidulated water, in proportion of 50 p. of rice to 250 p. of water, taking care that the temperature does not sink below 90° C. (= 194° F.). The quantity of acid (preferably sulphuric acid) may vary between 1½ and 3 per cent., the more dilute the acid the more regular the saccharification. The operation is conducted in a lead-lined mash-tub which is provided with a steam coil and a mechanical stirrer. As soon as the rice is completely permeated by the boiling water a sudden change is observed. The liquid begins to boil violently and the steam must be shut off at once, otherwise the liquid will boil over. The rice-mash becomes a much more thin liquid after it is boiled for 1 or 1¼ hours. The process is ended when the polarimeter indicates a specific rotation of 170 to 171, and then indicates a mixture of 2 p. maltose and 1 p. dextrin.

The acid liquor is now saturated carefully to within 10 per cent. of complete neutrality. The neutralization is then completed with milk of lime, care being taken not to render the liquor alkaline, but rather slightly acid. Upon now filtering through a Taylor's filter, a liquor is obtained of sp. gr. 1.115 to 1.125, corresponding to 30 to 32.5 per cent. This is concentrated in vacuum pans to 1.2 (about 52 per cent.), is again filtered to remove gypsum and albuminoid substances, evaporated to a thick mucilaginous consistence, and poured into moulds, in which it cools and becomes hard. The yield is from 78 to 80 per cent. of the rice-starch contained in the rice. Ph. Centr. H., Nov. 15th, 1877, p. 387.

Glucose and Dextrin—Interesting Formation.—C. Kosmann has made the interesting observation that when *gum senegal*, in aqueous solution, is allowed to remain in contact with metallic iron, it is converted into glucose and dextrin. *Celullose* (cotton fibre), when subjected to the same treatment, forms glucose and glycerin, while, when the fibre was macerated in solutions of permanganate of potassium or of bichromate of potassium, dextrin and some formic acid were formed. By prolonged digestion of lard, water, and metallic iron, at a temperature of 60° to 70° C. (= 140° to 158° F.), some iron soap was formed, and the liquid contained glycerin and some glucose. The author, therefore, infers that the glycerin was partially converted into glucose. The latter is, however, contradicted by the experiments of Liebermann. (Ber. d. Deut. Ch. Ges.) Ph. Centralh., No. 21, 1878, p. 194; from Bul. d. l. Soc. Chim. de Paris.

Arsenical Glucose.—J. Clouet, in view of the fact that glucose is used at present in very large quantities by brewers, confectioners, and others, and that its consumption is likely to assume immense proportions, warns from the use of *glucose containing arsenic*, the presence of which is owing to impure sulphuric acid used in its preparation. He has met with samples of glucose containing from 0.015 to 0.109 gram of arsenic in 100 grams of glucose. New Rem., Dec. 1877, p. 363; from Rép. de Ph., 1877.

Crystallized Grape Sugar.—In 1875 a cargo of starch-sugar was sent from England to Australia, but not having been accepted it had to be brought back. On being opened it was found to be partially crystallized and to resemble cane-sugar. Samples were sent to W. E. Halse and J. Steiner for analysis. They were of three different sorts,—amorphous, amorphous with crystallization on it, and others completely crystallized. The amorphous substance differed in no way from common starch-sugar. The second sample consisted of amorphous dark-brown lumps, of a pasty nature, with completely developed crystalline groups (rosettes) imbedded in it, and a yellow, very fine crystallized thin crust on some parts of the surface. The rosettes are from the size of a bean to a chestnut; have a clear amber color, and when separated by suitable means, and freed from amorphous sugar, weighed 4 to 5 grams each. The leaves of the rosettes resemble, in the outer part, front teeth, or wedges with spheric surface and sharp edges. They seem a little harder than cane-sugar crystals, and are very brittle. The third kind of sample presented completely crystallized compact pieces, which were composed either of wart-like crystals, or only of a very fine dense crystallization. They kept dry in the open air, were very hard, so as to require a hammer and chisel to break them up, and on being ground a dry powder resulted, which is never the case with ordinary starch-sugar. The results of the analyses of the crystals (rosettes and warts), and also of the original samples, is as follows:

Crystals.

	Rosettes.	Warts of the Size of a Bean.	Warts, Smaller.	$C_6H_{12}O_6 + H_2O$ (O = K). Corresponding to
Ash, ...	trace	trace	trace	——
Water, . . .	9.45	9.26	9.45	9.09
Glucose, . .	90.35	90.45	90.20	90.91
Dextrin, . .	0.20	0.29	0.35	——
	100.00	100.00	100.00	100.00

Samples.

	Amorph. with Rosettes.	Amorph. without Rosettes.	Fine Crystallized.	Wart-like, Small.	Wart-like, Larger.	Amorphous.
Ash, ...	0.36	0.37	0.33	0.29	0.15	0.45
Water, ...	12.00	12.20	11.80	11.20	10.50	8.60
Glucose, . . .	80.10	78.60	81.40	84.60	85 00	83 90
Dextrin, . . .	1.74	1.90	1.53	0.79	0.68	1.54
Optic. in act. subst.,	5.80	6.93	4.94	3.12	3.67	5.51
	100.00	100.00	100.00	100.00	100.00	100.00

The amount of substance insoluble in water in these samples is only trifling. The ash consists chiefly of gypsum. The melting-point of the rosettes is near 85° C. (= 185° F.), and that of the warts about 90° C. (= 194° F.). The drying, which required much care and attention, could be effected at about 90° C. (= 194° F.). A higher temperature causes the crystals to caramelize and decompose. It is very interesting that crystals in two distinct forms should have been produced. Evidently the long voyage in a tropical climate furnished not only the necessary condition for the melting of the substance, but was also favorable for such a slow crystallization as grape-sugar requires. Ch. News, Aug. 24th, 1877, p. 87.

Glucose—Reactions of its Solution as compared with those of Saccharose.—A. Gawalowski reviews the various tests recommended for the presence of glucose, and draws attention to the following comparative reactions of glucose and saccharose, which seem to be calculated to distinguish between the two sugars in the same solution:

SACCHAROSE.	GLUCOSE.
A Solution of 1 *p. Potassa in* 10 *p. Water*	
yields, when heated to 100° C. (= 212° F), no yellow coloration. The color of solutions, which are naturally yellow, is not darkened.	yields at 100° C. (= 212° F.) a more or less yellow to brown coloration.
Neutral Molybdate of Ammonia	
is not changed at 100° C. (= 212° F.) even during prolonged contact.	becomes blue, at the same temperature, after a time.

Alkaline Solution of Copper, prepared according to Monier
("Organ für Zuckerindustrie," 1874, p. 37),

is not changed at 70° C. (= 158° F.).	is reduced at 70° C. (= 158° F.).

Some varieties of cane-sugar produce with the copper solution bluish or greenish sediments. These are due to legumin, metapectic acid, and mannit formations.

Alkaline Solution of Copper, prepared according to Gawalowski,[*]

is not reduced in the cold.	is reduced at the ordinary temperature in ½ hour.

Basic Nitrate of Bismuth, together with a little NaO, CO_2,

is not browned when heated to 100° C. (= 212° F.), even after 24 hours' exposure.	is, under the like conditions, immediately colored brown to gray-black.

Ammoniacal Solution of Acetate of Lead[†]

yields with cane-sugar in the cold an insoluble saccharate of lead, which is soluble in boiling water, and again deposited on cooling.	yields with glucose a compound of oxide of lead and glucose, which is redissolved in the cold precipitating liquid, but again precipitated when heated to 70° or 80° C. (= 158° or 176° F.).

Both precipitates deposit on the bottom of the test-tube

dense granular.	voluminous and flocculent.

If now an alcoholic solution of chemically pure curcumin (see the author's paper in Ph. Centr. H., 1877) is added, and the mixture is shaken, the respective sugars are colored:

pure rose-red.	more or less flesh-colored.
The precipitate rises in the test-tube after long standing and forms a thin, dense layer.	The precipitate also rises, but remains very voluminous and flocculent.

Ph. Central H., Dec. 27th, 1877, p. 441.

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[*] This is obtained by mixing the alkaline copper solution of Monier with a large quantity of 90–92 per cent. alcohol, shaking strongly (whereby an oily deep-blue layer and a faint-blue light layer, with an intermediate layer composed of a saline crust, is formed), filtering, and separating the lower layer, which is washed by agitating several times with alcohol, and preserved in black, blue or brown vials. Its sp. gr. = 1.4122.

[†] This is made by dissolving acetate of lead in water, adding, with frequent shaking, ammonia, drop by drop, until a permanent turbidity is produced, and then filtering the solution.

Glucose—New Quantitative Reagent.—Hager, referring to the fact that none of the quantitative reagents for glucose are reliable in all cases, proposes the following, which depends upon the facility with which a solution of mercuric acetate, containing chloride of sodium, is reduced to calomel on boiling it for some time with glucose; the quantity of calomel formed being in direct and constant proportion to the quantity of glucose present: 30.0 grams red oxide of mercury are triturated with 30.0 grams of acetate of sodium, transferred to a glass flask, 25.0 grams of conc. acetic acid (or 100 cc. of the diluted acetic acid of the Ph. Germ.), and 50 grams of chloride of sodium are added, and then sufficient warm water to produce about a liter of solution. Solution is facilitated by agitation and gentle heat. When cold, the solution is filtered, and may then be kept for years in a shady place if well stoppered. The aqueous solution of glucose, whether alkaline, neutral, or acid, is treated with an excess of the reagent, observing that the mixture shall react and retain its acidity until the completion of the treatment, which consists in boiling until a portion of the filtering liquid—proved to contain some undecomposed mercuric acetate by the addition of ammonia to a few drops—no longer assumes turbidity on further boiling. The precipitated calomel is collected on a filter, washed with very dilute hydrochloric acid (but a 5 per cent. acid may be used if it is deemed expedient), and then with water; after which it is washed with alcohol, dried on a water-bath, and weighed. The quantity found, divided by 5.88, gives the quantity of glucose present—1 gram of glucose corresponding to 5.88 grams of calomel.

Under the above-named conditions, the reagent is not affected by cane-sugar, glycerin, gum arabic, dextrin, or uric acid. Urine, however, contains substances which have the power of reducing the mercuric salt. The cinchona alkaloids and morphia also have reducing power; strychnia has not. Reciprocally, mercuric salt may be determined by the reducing action of glucose. Ph. Centr. H., Sept. 27th, 1877, p. 313.

Sugar—Determination in Commercial Products.—Aimé Girard recommends the following method for determining the reductive sugar in the sample: To this end 100 cc. of a well-prepared cupro-potassic liquor is brought to a boil, and if it resists this test, a known volume of the saccharine solution is quickly poured in, observing that the quantity is such that the copper solution shall be in excess. The mixture is kept boiling for a minute or two, and as soon as the precipitate of suboxide has taken the fine red tint characteristic of the granular state it is thrown upon a rapidly acting filter, and washed with boiling water until the washings are no longer alkaline. The filter is then folded, placed in a large platinum boat, dried rapidly over the gas-lamp, and burnt in the air. After cooling, the boat is introduced into a combustion-tube, and the copper reduced in a current of hydrogen. It is then weighed. Another portion of the same saccharine solution is now treated with hydrochloric acid on a water-bath (according to the indications of Clerget), then diluted with water, boiled for a few moments, and the solution is then treated with cupro-potassic liquor, etc., precisely as in the case of the normal saccharine solution. The difference in the weight of reduced copper found is due to the saccharose which has by the second treatment been converted into reductive sugar. 1 gram of reduced copper corresponds to 0.569 gram of reductive sugar; 1.71 grams of reductive sugar correspond to 1.80 of saccharose. Ch. News, Nov. 16th, 1877, p. 223; from Compt. Rend., Oct. 29th, 1877.

Glucose—Modification of Böttger's Bismuth Test.—O. Maschke recommends a solution of tungstate of sodium in water, acidulated with acetic acid (30 p. crystallized tungstate of sodium, 75 p. diluted acetic acid, 120 p. water), for the removal of protein bodies present in the solution to be tested for glucose by Böttger's method (see also Proceedings, 1877, p. 287). The liquid (urine) is treated with ¼–⅓ volume of the solution of tungstate of sodium, and is filtered from the precipitated protein substances after several minutes, the filtrate being tested to insure the complete removal of the latter. About one-half a volume of strong solution of soda is then added, followed by a small quantity of basic nitrate of bismuth, and the mixture is well shaken, no attention being paid to any coloration—dirty violet, blue or green—that may occur. If, however, the deposit of bismuth has assumed a brownish or black color, this is due to the presence of sulphide of sodium, which must be removed before the glucose test can be applied, and a fresh portion of urine must be used. To this end a portion of urine is faintly acidulated with acetic acid, a small quantity of basic nitrate of bismuth is added, and the mixture is well shaken. After a short time the sulphuretted hydrogen is completely removed, the liquid is filtered, and may then be treated as above mentioned. It is then boiled, when, in the presence of glucose, a more or less distinct black deposit is formed.

In the presence of very small quantities of glucose—such as may be present in normal urine—the boiling has to be prolonged, in which connection the basic nitrate of bismuth serves a good purpose, causing the ebullition to be regular and preventing the spurting of the liquid in the test-tube. With such small quantities the deposit of the black substance may not take place until after the test-tube has been standing for some time. The author draws attention to the fact that oxide of bismuth is slightly soluble in boiling solution of soda, and that the liquid, therefore, becomes turbid on cooling. The formation of a deep black color on the undissolved bismuth, before the liquid has actually boiled, may be regarded as conclusive evidence of diabetic urine. Ph. Centr. H., Dec. 20th, 1877, p. 436.

Glucose—Presence and Determination in Blood.—Cl. Bernard communicates some experiments on the determination of sugar in blood. The sugar, which is found in the normal blood of man and animals, is the same as that occurring in diabetic urine. It belongs to the glucose group, is right-rotating, undergoes the vinous fermentation in contact with beer-yeast, reduces copper salts in alkaline solutions, and is colored yellow to brown by boiling with alkalies. By evaporation of an alcoholic extraction of the concentrated blood, or by precipitation with ether from such an extraction, the sugar may be obtained in substance. All of these conditions must be fulfilled in order to determine its presence in blood with certainty, and with this in view it is necessary to first completely remove the albumen. The author suggests three methods to accomplish this: 1. The blood is coagulated by boiling water or superheated steam, and the liquid is then evaporated and decolorized. 2. The blood is coagulated by alcohol, the alcoholic solution is evaporated, and the alcoholic extract redissolved by water. 3. The blood is coagulated and decolorized by saline compounds, particularly sulphate of sodium, which does not interfere with any of the reactions for sugar that are referred to above—not even its fermentation—and, moreover, is the most efficient coagulating and decolorizing agent. Other sodium salts, such as the chloride, sulphide (sulphite?), acetate, or tartrate may be used, although not to the same advantage as the sulphate. Either of the three methods will yield good results, and will enable the production of all the necessary reactions; but for the *quantitative determination of the sugar*, the author recommends the third method, as follows: Equal weights of blood and sulphate of sodium are heated to boiling in a porcelain capsule with constant stirring. A black, spongy coagulum soon forms, upon which the liquid is filtered off. The filtrate is colorless, clear, contains no albumen whatever, and may be at once titrated with an alkaline solution of tartrate of copper, *e. g.*, that of Fehling, of which each cc. indicates five milligrams of sugar. Schweiz. Wochenschr. f. Ph., July 20th, 1878, p. 231; J. de Ph. et de Chim.

Glucose—A New Method of its Quantitative Determination in Blood.—F. W. Pavy read a paper before the Royal Society, in which he describes minutely his new method for the quantitative determination of glucose, and its application to physiological relations of sugar in the animal system. Dr. Pavy claims that the accurate results which he has succeeded in obtaining by means of his new gravimetric process of analysis are such as will materially increase our knowledge, and hence will substantiate and extend the position with regard to the treatment and pathology of diabetes. The new method is as follows:

A certain volume of blood—about 20 cc.—is mixed with forty grams of sulphate of sodium. To this mixture, in a beaker of about 200 cc. capacity, about 30 cc. of hot concentrated solution of sulphate of sodium are added, and the whole contents heated until a coagulum is formed. Filtration is then performed, the coagulum is washed to remove all traces of sugar, and the filtrate again boiled and filtered if necessary to complete clarification. The perfectly clear filtrate is brought to ebullition, an excess (about 10 cc.) of potassio-tartrate of copper solution is added, and brisk boiling is continued for about a minute, but no longer. The suboxide of copper formed is collected by passing the mixture through a plug of asbestos, or, what is better, glass wool, the suboxide of copper is washed thoroughly, and dissolved by a few drops of nitric acid, a small quantity of peroxide of hydrogen having previously been added in order to effect oxidation and consequent ready solution. The copper so dissolved is now deposited by the agency of galvanism. The positive pole of the battery is formed by a platinum spiral coil, around which and forming the negative pole is a cylinder of platinum foil; upon this the copper is slowly deposited in a pure metallic form. This operation is continued until the approximate test shows that the whole of the copper has been thrown down. The period ordinarily required to effect this does not exceed twenty-four hours.

The platinum cylinder is next removed, and instantly plunged first into distilled water, and then into alcohol. After drying in a water-oven it is ready for weighing; the difference in the weight of the cylinder before and after the operation, giving the amount of copper deposited. The battery used by the author is a modification of Fuller's Mercury Bichromate Battery, and was selected on account of the constancy of its action. From the amount of copper deposited, that of the sugar existing in the blood analyzed may be accurately calculated. Five atoms of the cupric oxide of the last solution are reduced by one atom of glucose; one part of copper represents 0.5678 of glucose; therefore, to ascertain the amount of sugar the weight of the copper has to be multiplied by 0.5678. The accuracy and reliability of the process are strongly supported by the uniformity in the results obtained by the author from a large number of experiments.

Compared with the results yielded by this gravimetric process, those obtained by Bernard present the greatest discrepancy, his figures being invariably too high. Bernard's process (which see) is criticized by the author, who considers it not only devoid of precision as a quantitative analytical process, but maintains that it is in itself calculated to give rise to fallacious results, inasmuch as keeping the suboxide of copper dissolved by means of organic matter is fundamentally wrong. In a second communication the author deals with the question of the quantity of sugar in the system, determined by his method. Ph. J. Trans., July 14th, 1877, p. 28.

Glucose—Test Solutions.—Hager gives the formulas for the following test solutions for glucose:

Pellet's copper solution: 68.7 grams crystallized sulphate of copper, 200.0 grams chloride of sodium, 100.0 grams anhydrous carbonate of sodium, 6.87 grams chloride of ammonium, dissolved in hot water, and diluted to 1 liter. 10 cc. of the solution correspond to 0.05 gram of glucose.

Sachsse's mercury solution: 18.0 grams dry red iodide of mercury, 25.0 grams iodide of potassium, 80.0 grams caustic potassa, and water to make 1 liter. This test liquid is used as follows: 40 cc. are heated to boiling, and solution of glucose is added from a burette until a drop on a piece of filtering-paper is no longer blackened by sulphide of ammonium. 40 cc. of this solution correspond, according to the recent investigations of Sachsse, to 0.1342 (and not 0.15) of glucose. Dr. Hager suggests that this reagent should be brought to such strength that 40 cc. will correspond to 0.1 glucose. Such a solution is obtained by using 13.5 grams dry mercuric iodide, 19.0 iodide of potassium, and 60.0 potassic hydrate to 1006.5 cc. Ph. Centralh., June 13th, 1878, p. 217.

Glucose—New Reagent.—Egidio Pollaci recommends ferric oxide, prepared as follows, as a reagent for reducing substances in general, and in particular for glucose: Introduce into a tube 2 to 3 cc. of distilled water, into which is put, by means of a small glass rod, about half a drop of an aqueous solution of pure ferric chloride, then three or four drops of caustic soda dissolved in distilled water, and finally the substance to be examined. The mixture is now shaken, boiled a minute or two, and then a drop of sulphuric acid added. The tube is now cooled off by water, and when cool, its contents are tested with freshly prepared solution of ferricyanide of potassium. In the presence of reducing agents a blue precipitate is produced.

G. Mazzara recommends sesquichloride of nickel as a very sensitive reagent for glucose, its reductions to protoxide being marked by a change in color. He places a little of the sesquichloride into a test-tube, adds a little solution of potassium hydrate, and on heating along with the smallest quantity of glucose the sesquioxide is at once converted into a green powder. This reduction, however, like that of ferric oxide, takes place in presence of many organic bodies. Chem. News, June 21st, 1878; from Gazz. Chim. Italiana, 1878.

Optically Inactive Sugar.—W. E. Halse and J. Steiner, when examining a sample of liquor taken from the hold of a ship which had brought a cargo of cane-sugar, found that the sugar contained therein showed no influence on the polarized ray, but reduced the copper solution to an amount equal to 27.70 per cent. of glucose. As to the nature of this sugar, two cases were possible; it either might be a mixture of levulose and dextrose, or of levulose and saccharose in such proportion that their opposite rotations compensated each other; or simply a sugar having no action whatever on polarized light. Further experiments proved the latter to be the case: the sugar in the liquor is not a mixture, but a special kind of sugar which is optically inactive. Ch. News, Sept. 7th, 1877, p. 107.

Honey—Separation of Crystalloids from Colloids.—By subjecting filtered honey to dialysis on a parchment dialysator, E. Dietrich found that the surrounding water had acquired a pale yellowish color, and, on evaporation, yielded 50 per cent. of the crystalloids in the form of a clear little-colored golden-yellow honey, which did not crystallize from alcohol, but had such a fine taste and floral odor as the author had never before observed in honey. The colloids remaining in the dialysator contained slimy floccules, were destitute of honey-like odor and had an insipid sweetish taste. If the loss by colloids was not so great, the author would recommend the purification of honey by dialysis. A. J. Ph., Sept. 1877, p. 448; from Chem. Centralh., 1877.

Poisonous Honey.—An accident which a short time since befell the war correspondent of the *Daily News* in Armenia, recalls the fact, long known but generally forgotten, that honey sometimes possesses virulently poisonous properties. In this case the correspondent having drunk some water sweetened with honey was shortly afterwards seized with headache, vomiting, coldness of the extremities, temporary blindness, followed by a cataleptic state that appeared to bring him to the verge of death. Suspicion of an intention to poison fell upon an innkeeper, and he was arrested, but an examination of his honey, which was from the Batoum Valley, where hemlock and henbane grow abundantly, revealed the source of the injury. It is interesting to note that this incident occurred within a few miles of the spot where, more than two thousand years ago, a similar accident, but on a larger scale, happened to the "ten thousand," composing the Greek army, on their celebrated retreat. Dioscorides, Pliny, and other authors also mention poisonous honey. Ph. J. Trans., Sept. 8th, 1877, p. 184.

Milk Sugar—Lactic Fermentation.—Ch. Richet observes that if milk is placed in a stove heated to 40° C. (= 104° F.) it becomes acid, coagulates, and after a time acquires an acidity of 1.6 of lactic acid in 100 p. of milk. This limit is never exceeded. If a few drops of a mineral acid are added to fresh milk the fermentation is completely checked and no further acidity is developed. But if, instead of a mineral acid, we add acid gastric juice, the lactic fermentation is developed with extraordinary rapidity, and the milk reaches in four or five days an acidity equal to 4 per cent. of lactic acid. The fermentation is arrested in presence of a large quantity of phenol, but unless there is sufficient of this reagent to remain in part undissolved in the liquid the fermentation is merely delayed. Ch. News, March 22d, 1878, p. 123; from Compt. Rend., Feb. 25, 1878.

Nucit—A New Sugar Contained in the Leaves of Juglans Regia.—Tanret and Villiers have isolated a peculiar sugar from the leaves of *Juglans regia*, which appears to be nearly related to *inosit*, and which they have named *nucit.* It corresponds in its composition to the formula $C_{12}H_{12}O_{12}+4HO$, crystallizes in oblique rhombic prisms, has a sp. gr. of 1.54, is sweet, dissolves readily in water, alcohol, ether, and chloroform, is non-rotating, does not reduce salts of copper, and is not fermentable, even after prolonged boiling with dilute sulphuric acid. When boiled with dilute nitric acid it does not form either muriatic or oxalic acid. Zeitschr. Œst. Ap. Ver., Sept. 20th, 1877, p. 444; from Compt. Rend.

ORGANIC ACIDS.

Formic Acid—Preparation.—E. Gaillard gives a working formula for preparing the acid by the now well-known method of decomposing oxalic acid in the presence of glycerin. 250 parts of syrupy glycerin, 38 to 50 parts of water, and 250 parts of oxalic acid are heated together in a retort, to 100° C. (= 212° F.). The oxalic acid is destroyed, carbonic acid is evolved, while carbonic oxide and the elements of water unite to form formic acid (CH_2O_2). After ten hours all the oxalic acid is decomposed, and a small quantity of water charged with formic acid has distilled over. The glycerin and the largest part of the formic acid remain in the retort. Add 8 parts more of water and distil at a temperature of 120° C. (= 258° F.), adding water as long as the distillate is acid. The glycerin remains intact and can be used over. The acid is colorless, sour, and pungent to the taste. A. J. Ph., March, 1878, p. 115.

V. Merz and F. Tibirica prepare formic acid by conducting a current of carbonic oxide over soda lime at 200° to 250° C. (= 392° to 482° F.). The gas is rapidly absorbed, forming formate of sodium, and the process can be used for the technical preparation of the acid, as well as for a lecture experiment, to show the direct formation of organic substances from inorganic. Ch. News, April 26th, 1878, p. 174; from Ber. d. D. Ch. Ges., Dec. 10th, 1877.

Acetic Acid.—Edward Gaillard draws attention to some of the difficulties of depriving acetic acid of empyreuma during the process of its manufacture. The method of maintaining the soda or calcium salt at a sufficiently elevated temperature to effect carbonization of the empyreumatic matter also results in the partial decomposition of the acetic acid. In some parts of France and Germany the baryta salt is so treated, which being less liable to decomposition at the temperature required for the carbonization of empyreumatic matter, gives better results. But an acid perfectly free from empyreuma is seldom met. Various samples were examined by the author, and all were found, after neutralization, to discharge the color of dilute permanganate of potassium. The author suggests the following tests as necessary to determine the impurities common in acetic acids. The test for nitric acid given by the U. S. Pharm., *i. e.*, digestion with silver and addition of HCl, is, in the author's experience, not reliable, and hence he recommends the more certain one with sulphate of iron:

Adulterations.	Tests.	Pure.	Impure.
1. Water.	1. Hydrometer. 2. Odor.	1. Sp. gr., 1.047. 2. Agreeable smell.	1. Lighter. 2. Empyreumatic odor.
2. Empyreumatic oils.	2. Boiled with an equal volume of sulphuric acid.	2. The acid is not colored.	2. The acid is colored.
3. Nitric acid.	3. Neutralized with carbonate of potassa, with addition of pure sulph. acid, and then concentrated solution sulphate of iron.	3. No dark ring at point of contact of iron solution.	3. A dark ring.
4. Muriatic acid.	4. Addition of nitrate of silver.	4. No precipitate.	4. Precipitate.
5. Sulphuric acid.	5. Chloride of barium.	5. No precipitate.	5. Precipitate.
6. Sulphurous acid.	6. Sulphuretted hydrogen.	6. No precipitate.	6. Milkiness.
7. Lead.	7. Sulphide of ammonium.	7. No precipitate.	7. Black precipitate.
8. Copper.	8. Sulphide of ammonium.	8. No precipitate.	8. Black precipitate.

9. Lime.	9. Oxalate of ammonium.	9. No precipitate.	9. White precipitate.
10. Formic acid.	10. Boiled with an equal volume of solution of nitrate of silver or proto - nitrate of mercury.	10. No precipitate.	10. Separates the nitrates by reducing them to the metallic state.

A. J. Ph., June, 1878, p. 293.

Dibromide of Acetic Acid.—Although bromine and acetic acid do not react on one another in the slightest degree when brought together, C. Hell and O. Mühlhäuser have found that the addition of a minute quantity of CS_2* causes at once a development of heat, and the mixture is changed rapidly into a mass of crystals of the composition $C_2H_4O_2Br_2$ ($O = 16$). They form at first orange-colored tufts of needles, but change on standing into thick red prisms. The compound melts at 36° C. (= 96.8° F.), is excessively hygroscopic, attacks the eyes, and can be sublimed. Water decomposes it. Other liquids CCl_4 or $CHCl_3$ do not possess the peculiar catalytic action of CS_2, which only can cause the formation of this new molecular compound. Ch. News, April 26th, 1878, p. 173; from Ber. d. D. Ch. Ges., Dec. 10th, 1877.

Valerianic Acid—Purification.—According to Lescœur valerianic acid prepared from fusel oil is frequently contaminated with homologous acids, as well as with valerianate of amyl. To remove these, the author recommends dissolving in two equivalents of the crude acid, one equivalent of valerianate of sodium, by gentle heat. On standing in a cool place the solution deposits crystals of tri-valerianate of sodium, which are dried upon porous plates, and finally by pressing between blotting-paper. These yield, on distillation with sulphuric acid, a perfectly pure valerianic acid, provided that anything which distils over below 260° and over 280° F. is rejected. New Rem., Jan. 1878, p. 13; from Chem. Centrl. H.

Propionic Acid—Simple Method of Preparation.—H. Backunts and R. Otto propose a method for the preparation of propionic acid, which is founded on the fact that propionitril is readily decomposed by sulphuric acid of a certain strength, and that the propionic acid thereby produced is insoluble in the solution of sulphate of ammonium formed at the same time. 50 grams of propionitril are heated in the water-bath to about 100° C. (= 212° F.), with 150 grams of a mixture of 3 vols. of sulphuric acid and 2 vols. of water. The reaction is complete in about 2 hours. After allowing the liquid to cool to 50° C. (= 122° F.) the colorless and nearly pure propionic acid is separated and freed from traces of water and sulphate of ammonium by rectification. The yield is almost quantitative.

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* Bromine, 50 grams; acetic acid, 20 grams; CS_2, 4 to 10 drops. A. J. Ph., April, 1878, p. 182.

The authors find that propionic acid is capable of producing three dichloro—substitution—products, which they have designated respectively as α, β, and γ dichloropropionic acid. Of these the second only was known till a short time ago. They now particularly describe

a Dichloropropionic acid, and its compounds. To prepare this, one part of *a dichloropropionitril* is heated with 2 to 3 parts of a mixture of equal vols. of concentrated sulphuric acid and water to about 120° C. (= 248° F.). The reaction is over when the oily layer which floats on the sulphuric acid no longer boils. The oily layer is removed on cooling and the acid rectified. Too great a quantity or concentration of the sulphuric acid causes the formation of decomposition products. The acid boils at 185° to 190° C. (= 365° to 374° F.), and remains liquid at —8° C. (= +17.6° F.). It may be distilled alone or with steam without separation of hydrochloric acid. The salts of a-dichloropropionic acid with *potassium*, *ammonium*, *silver*, *calcium*, *barium*, and *zinc*, were obtained by addition of the base to the acid in solution with water or alcohol. With the exception of the silver salt, they are stable when dry at ordinary temperatures, but are decomposed when heated with formation of a metallic chloride. They are generally soluble in water and in alcohol, and their solutions also undergo some change when warmed, especially if the salts contain an excess of base. The ethers of this acid are easily prepared by the action of hydrochloric acid on the solution of the acid in the corresponding alcohol. The authors have obtained and describe the *methyl-*, ethyl-, allyl-, and isobutyl-ether of this acid, and communicate some interesting facts in relation to its behavior to *nascent hydrogen*, its conversion into *monochloride acrylic* acid, and into *acetic* and *carboacetoxylic* acids. They also describe

Solid Dichloropropionitril, which appears to be formed along with the liquid *a dichloropropionitril* when chlorine is caused to act on propionitril, and appears to have the same composition. It crystallizes from alcohol in rhombic tables, melting at 73.5° C. (= 164.3° F.). J. Chem. Soc., Aug. 1877, pp. 179 to 182; fr. Ber. d. Deut. Ch. Ges.

Benzoic Acid.—Ch. Rump shows by his experiments that benzoic acid does not exist in the free state in benzoin, but that it is united to a second acid, and that, therefore, the old method of direct sublimation from the resin must be regarded as irrational. A constant and active preparation can only be obtained by separating the acid by the wet method and then subjecting it to sublimation. The author regards it probable that the benzoic acid of commerce is a mixture of the natural with the artificial acid. Pharm. Centralh., June 27th, 1878, p. 237.

Benzoic Acid—Pharmaceutic Application as an Anti-ferment.—B. Archer, in an experience of several years, has found benzoic acid to serve an excellent purpose in preventing or retarding fermentive change in many pharmaceutical preparations, such as syrups, infusions, decoctions, and mixtures. By using benzoic acid water, made in the proportion of 4 grains to 1 pint, in making these preparations, or adding benzoic acid in that proportion to finished preparations of an unstable character, their stability may be preserved as long as it is usually desired to keep them. The author recommends the use of benzoic acid water especially for making solutions for hypodermic use; and he considers its application as diluent in the mixtures of extemporaneous pharmacy very desirable, thereby preventing the changes that so often occur before the medicine is consumed, without interfering with the therapeutic action, or with the chemical components that may enter it. On this latter account, especially, it is preferable to salicylic acid. A. J. Ph., April, 1878, p. 169.

Benzoates—Occurrence in Profitable Quantities in Suint.—Chevreul demonstrated how the wool proper by no means constitutes the major portion of a sheep's fleece. An analysis of merino wool is as follows: Earthy matter washed out by water, when the wool is washed, 26.06; suint, soluble in cold water, 32.74; a peculiar grease is found in the interior of the wool fibre, soluble in alcohol, 8.57; earthy matter fixed by the fats, 1.40; wool, properly so called, 31.23. The earthy matter, consisting mainly of carbonate of potassium, the wash-waters from wool-washing, containing also the suint, are now utilized for the production of the potash salt, Mauméne and Rogelet being the pioneers of this new industry. In this process the suint is destroyed by carbonization. Schulze and Allrich having announced the existence of benzoate in that portion of suint remaining undisturbed by the action of alcohol, Andrew Taylor, desiring to test its availability as a source for benzoic acid, made the following experiment:

A ton of suint was distilled, in suitable portions, with an equal quantity of petroleum spirit (? Rep.), in an 80-gallon steam-jacketed still, working at a pressure of 20 lbs. to the square inch. From one ton of suint, measuring 150 gallons, the author obtained 30 gallons of a yellow fatty liquid, having a sp. gr. of 1.2, and giving the characteristic tests for benzoic and hydrocyanic acid. When this fatty liquid was boiled for about an hour and a half with one-eighth its volume of hydrochloric acid, a brown liquid was formed, which was filled with crystals of benzoic acid. It does not appear that the author has determined the exact quantity of benzoic acid yielded. He says: the sides of the vessel were covered with shining needles of benzoic acid, and that the drainings yielded a further quantity, amounting to nearly three pounds to the ton of suint. He has found, furthermore, that the water washed from the wool yields nearly 3 per cent. more of benzoic acid than the concentrated suint. The material for making benzoic acid may, he thinks, be readily collected at every sheep-washing station. Yearbook of Ph., 1876, p. 568.

Nitrobenzoic Acid.—F. Fittica finds, that when nitrite of ethyl is dropped into a solution of cinnamic acid in sulphuric acid, ortho- and para-nitrobenzoic acids are formed. He has furthermore found, that by the action of nitrite of ethyl on an ethereal solution of benzoic acid, in presence of strong sulphuric acid, a nitrobenzoic acid ($C_6H_4(NO_2), COOH$) ($O = 16$), melting at 127° C. (= 260.6° F.), and dissolving in 380 parts of water at 16° C. (= 60.8° F.). is formed. The silver salt of this acid, when digested with iodide of ethyl at temperatures not exceeding 18° C. (= 64.4° F.), yields an ether which crystallizes in small yellowish needles melting at 37° C. (= 96.8° F.), and dissolving easily in alcohol and ether, but not in water. The salts of this nitrobenzoic acid are readily converted by recrystallization into salts of the isomeric metanitrobenzoic acid; but the free acid is not so transformed, either by recrystallization or by heating above its melting-point. The author described, in a previous paper, an acid isomeric with the above, melting at 135° C. (= 275° F.).

This acid, he now finds, yields an ether identical with that obtained from the above acid. Besides the two acids mentioned, the author has obtained two other acids of the same composition, melting at 128° and 142° C. (=261.4° and 287.6° F.) and differing in physical character from those previously described. They are lemon-yellow, crystalline bodies, dissolving more freely in water than the other acids, and forming lemon-yellow barium, silver, and lead salts, which again yield yellow acids by decomposition. Their ethers are also yellow. The author has also obtained and describes *Benzo-nitrobenzoic acid,* a compound of benzoic acid and the nitrobenzoic acid, melting at 138° C. (= 280.4° F.). It yields an ethyl ether, which is a greenish liquid, of faint, somewhat pungent odor, and distils without decomposition. J. Chem. Soc., Oct. 1877, p. 483; from Ber. de Deut. Chem. Ges.

Benzoic Acid—Relative Anti-fermentive Value.—R. V. Mattison has made some experiments with a view to testing the relative value of certain anti-ferments, by adding to a strong infusion of barley malt, certain quantities of Schering's salicylic acid, benzoic acid from benzoin, and bisulphite of calcium, and found that benzoic acid, while not entirely preventing fermentation, had a much more marked influence in arresting and aborting this change, than did either salicylic acid or bisulphite of calcium. A. J. Ph., Feb. 1878, p. 62.

Salicylic Acid—Natural and Artificial.—J. Williams has had occasion to prepare some quantities of salicylic acid from oil of wintergreen, and in the course of his experiments has made some interesting observations. When comparing the physical properties of the two varieties of acid, he was much struck with a great difference in appearance, and on applying chemical tests he obtained still stronger indications that the two substances are not in every respect identical. Limiting his remarks in the present paper to the better varieties of artificial salicylic acid—which is mainly produced in Germany—the author observes that when it is attempted to recrystallize the latter, we fail in getting it to crystallize like the natural acid, even when the conditions are apparently exactly alike; the artificial acid still giving small and confused masses of crystals, and if the beaker in which the crystallization is proceeding be watched, it will be observed that the crystallization assumes different appearances as the liquid cools, the first crystals appearing much more needle-like than those deposited when the liquid becomes cooler. Crystallization from chloroform also fails to give the two acids an identical appearance. The artificial acid also appears to be more soluble in boiling water than the natural, one drachm of which requires just about three ounces of boiling water, while the best quality of crystallized artificial acid only requires about two ounces. On adding to the respective hot solutions one-fifth of alcohol, and allowing them to cool in beakers, the natural acid crystallizes out in separate distinct crystals, not cohering together, while the best artificial acid produces a fine network of needle-shaped, but very small crystals, from which the mother liquid may be drained by simply inverting the beaker. The author accounts for these differences by the presence of a second body which is produced in the manufacture of the artificial acid by the now well-known process from carbolic acid. It is well known that when potash is substituted for soda in the process, there is no salicylic acid formed, but instead, another closely allied body, paraoxybenzoic acid, and there are many reasons why the product from carbolic acid should not prove uniform, such as impurities or variations in the constitution of the carbolic acid, etc. The author has, however, succeeded in obtaining from the best artificial acids of commerce some salicylic acid that corresponds completely with the natural acid, and he has also isolated the second crystalline body, which forms silvery plates, and is not paraoxybenzoic acid. The method by which the artificial acid of commerce was broken up into its constituent parts, consists in converting the crude acid into a calcium salt by treatment with carbonate of calcium in excess, from which the salicylate is readily separated by crystallization, and purified by several recrystallizations. The salt is then decomposed by hydrochloric acid, and the precipitated acid purified by several crystallizations, finally from weak alcohol. It forms large white well-formed crystals, absolutely identical in appearance with the natural acid.

Salicylate of sodium made from the acid so purified crystallizes, as does that from the natural acid, in large pearly plates, very different from that made from the ordinary acid.

The "second compound" has not yet been nearer examined; it appears to exist in the best commercial salicylic acids to the amount of 15 to 25 per cent., and while much more soluble than natural salicylic acid, is less so than paraoxybenzoic acid. Further experiments are in progress. Ph. J. Trans., April 6th, 1878, p. 785.

Salicylic Acid—Saturation Table.—Saturated or neutral solutions of salicylate of sodium may be obtained, according to Dr. Hager, by using salicylic acid and bicarbonate of sodium or crystallized carbonate of sodium in the proportion given in the following table:

Salicylic Acid.		Bicarbonate of Sodium.		Crystallized Carbonate of Sodium.
5.0	require	3.25	or	5.2
6.0	"	3.90	"	6.3
7.0	"	4.55	"	7.3
8.0	"	5.20	"	8.3
9.0	"	5.80	"	9.4
10.0	"	6.50	"	10.4

Ph. J. Trans., July 28th, 1877, p. 70; from New Rem.

Salicylic Acid—Determination in Syrups, Extracts, Beverages, etc.—The liquid is evaporated, to remove any alcohol that may be present; it is then treated with a decided excess of dilute sulphuric acid, and then shaken with ether, which dissolves the salicylic acid and leaves it upon evaporation in a condition suitable for the usual reactions. Ph. Centr. H., Sept. 27th, 1877, p. 321.

Salicylic Acid—Compounds with Borates.—E. Jahns has studied the relation of salicylic acid to borax, and has found that the acid is capable of forming definite compounds with the various salts of boric acid.

Boro-disalicylate of sodium was obtained as follows: 76 grams (1 mol.) of borax were dissolved in 400 grams of water, 110 grams (4 mol.) of salicylic acid added, and the mixture heated for some time to boiling; the solution was then diluted with 600 grams of water, but not crystallizing in the cold, it was evaporated to about 500 grams, when, after standing a day, a crust of white, opaque, warty groups of crystals were obtained. Analysis proved this compound to have a composition corresponding to the formula $C_{14}H_{10}O_5NaBo_2$ ($O = 16$). The mother liquor, upon further concentration, deposited boric acid. The salt is readily soluble in boiling water and in alcohol, but nearly insoluble in ether. The hot aqueous solution is strongly bitter, has an acid reaction, browns curcuma paper, and is colored violet by ferric chloride;

it is not changed by acetic acid, but hydrochloric and other strong acids precipitate salicylic acid. Cold water decomposes the salt, which, it is true, is dissolved, but is decomposed as fast as dissolved with separation of salicylic acid; and even a moderately dilute solution, prepared with heat, deposits, on long standing, crystals of salicylic acid. In either case the liquid retains a bitter taste. The salt may also be obtained by heating together 1 mol. each of salicylate of sodium, salicylic acid, and boric acid. By substituting salicylate of potassium, or ammonium, or magnesium, or calcium—prepared freshly from the acids and the carbonates of the respective bases—corresponding boro-disalicylates of these bases are readily obtained; the manipulations varying very slightly.

Boro-disalicylate of potassium resembles the sodium salt very closely; the crystalline crests are somewhat harder; like the sodium salt, it is anhydrous, and has a bitter taste.

Boro-disalicylate of ammonium corresponds in its general character to the two previously mentioned salts.

Boro-disalicylate of magnesium forms soft, transparent crystals very readily; it is readily dissolved by water, its solutions showing very little disposition to change, and it has a bitter taste. The form of the crystals is that of elongated tables, and they contain water of crystallization, the greater part of which is driven off at 100° C. (= 212° F.), and completely so at 150° C. (= 302° F.).

Boro-disalicylate of calcium is obtained in transparent crystalline plates, and corresponds in its general characters to the magnesium compound. It is readily dissolved by cold alcohol, and, like the magnesium compound, becomes opaque when placed in cold water, remaining undissolved, and being decomposed by it only after a long time. It also contains water of crystallization, which is completely given off at 150° C. (= 302° F.).

The author concludes, as a result of his investigation, that the limit of the solubility of salicylic acid in borax is 4 mol. (552) of the former to 1 mol. (382) of the latter. Such a solution, when diluted, gradually deposits salicylic acid. Arch. Ph., March, 1878, p. 212–226.

Salicylic Acid—Compounds with Albuminoids and with Iron.—Fr. Farsky has prepared compounds of egg-albumen, casein, fibrin, and syntonin with salicylic acid, by several methods. Either the albuminoid and the acid were mixed together and allowed to stand with constant stirring, or the two were combined in a dialyser, or the vapor of the acid was made to act on the finely-powdered substance. Whichever method of preparation was adopted, the solid substance was finally extracted by pure ether, which was shaken up with it as long as the filtrate gave a reaction with ferric salts. The albumen-compound was then washed with hot water, and dried in an air-bath at 120–130° (? C.). Analyses showed that on an average 14.16 per cent. of salicylic acid was contained in the compound, which points to the formula $C_{72}H_{112}N_{18}SO_{22} + 2C_7H_6O_3$. These compounds are found to be quite as easily digestible as the uncombined albuminoids, so that salicylic acid might possibly be used for the preservation of feeding-stuffs.

In connection with the above researches the author gives an account of some more accurate investigation of salicylic acid. He also refers to some metallic compounds of the acid, and states that it is capable of forming three salts with ferric oxide, a normal salt, a basic salt, and a so-called ferric ferrosalicylate. Ph. J. Trans., April 27th, 1878, p. 851; from Chem. Centralbl., 1877.

Acid Salicylates. — Hitherto only two compounds of salicylic acid and sodium have been known, the one being that in common use, composed of one mol. of acid and one mol. of base; the other the basic salt, composed of one mol. of acid to two mol. of base. A third compound has now been obtained by E. Hoffmann, an

Acid Salicylate of sodium, containing two mol. of acid and one mol. of base. The compound is obtained by dissolving one molecule (160) of neutral salicylate of sodium and one mol. (138) of salicylic acid in alcohol, and concentrating the solution. Octahedral, colorless, transparent, hard, and very handsome crystals of the new compound are thus deposited, which are permanent in the air, but are immediately decomposed in contact with water, salicylic acid being separated; the latter change being quite brilliant when viewed under the microscope. The compound was, however, originally formed in concentrated aqueous solution of slightly acid salicylate of sodium.*

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* The acid compounds described by the author all appear to keep in concentrated, and to decompose in dilute aqueous solutions.

By operating in the same way, the author has obtained the corresponding potassium, lithium, and ammonium compounds.

Acid salicylate of potassium was obtained in large, hard, rhombic crystals.

Acid salicylate of lithium forms short rhombic prisms and octahedrons.

Acid salicylate of ammonium was obtained in needle-shaped moss-like crystals.

Magnesium appears also to form other compounds with salicylic acid than those generally known, but the author has not succeeded in obtaining a definite compound, corresponding to the new compounds mentioned, either with magnesium, or with barium, calcium, or strontium. Arch. Ph., March, 1878, p. 226–234.

Salicylate of Sodium.—E. Hoffmann remarks, that in the preparation of salicylate of sodium, two properties of salicylic acid must be remembered: 1. The intense coloration produced by even traces of ferric compounds; and 2. The rapid decomposition of the acid, by assimilating oxygen, after supersaturation with alkalies. Both must, therefore, be avoided: the first, by employing pure bicarbonate of sodium; and the second, by employing a slight excess of acid. Ten parts of bicarbonate of sodium and 16½ parts of salicylic acid (the so-called "dialysed" acid represents the purest article), are mixed with water to form a thick magma, which, after the greater part of CO_2 has been given off, is evaporated to dryness on a water-bath. The mixture should react distinctly acid; if it does not, owing to variability of the ingredients used, more acid must be added before evaporation. When dried at 100° C. (212° F.) the compound so obtained is anhydrous; it absorbs eight per cent. of water in a moist atmosphere. The author, however, does not consider it necessary to prepare the dry salt for the purpose of the pharmacist, since it is almost invariably dispensed in solution; by dissolving the above quantities of bicarbonate and acid in forty-four parts of water, heating for a short time to drive off the CO_2, a

Conc. solution of salicylate of sodium, containing 33⅓ per cent. of salicylate of sodium, is obtained. It keeps well, and has the following sp. gr. at various temperatures:

At 10° C. (= 50° F.) = 1.155; at 12° C. (= 53.6° F.) = 1.154
" 14° C. (= 57.2° F.) = 1.153; " 16° C. (= 60.8° F.) = 1.152
" 18° C. (= 64.4° F.) = 1.151; " 20° C. (= 68° F.) = 1.150

Arch. Ph., May, 1878, p. 443.

G. W. Kennedy prepares this salt by saturating a 20-per cent. solution of pure white caustic soda with pure salicylic acid, filtering and evaporating the solution on a water-bath, stirring until the salt is powdery dry. The product, he states, is white. A. J. Ph., Dec. 1877, p. 592.

Salicylates of Potassium, Sodium, and Ammonium—Preparation.—Nathan Pennypacker observes that the chief difficulty in making the compounds of salicylic acid with alkalies is found in the tendency of the solutions to become dark on exposure to air. This can in great part be obviated by mixing a portion of the acid with water, and without the aid of heat, adding the bicarbonate of potassium or sodium so long as there is effervescence, or ammonia-water in slight excess, and evaporating the solutions rapidly to dryness by the heat of a water-bath; the dry residue is dissolved in alcohol, the clear liquid is poured off, and evaporated to dryness. The product in each case is a fine white crystalline powder. To insure success, however, too long exposure to air must be avoided, and the solutions should be decanted rather than filtered, as by the latter the solutions become dark-colored. A. J. Ph., March, 1878, p. 117.

Salicylate of Zinc.—Ferdinand Vigier prepares it by mixing salicylic acid and distilled water in a porcelain capsule, heating the mixture to boiling and adding small quantities of oxide of zinc, previously diffused in a little water. The solution is readily effected and when the oxide ceases to dissolve, it is filtered and cooled, the mother liquor is evaporated at a moderate heat, and again set aside to crystallize. At a boiling temperature, decomposition into a sparingly soluble basic salicylate of zinc takes place. Contact with iron, and other metallic substances, must be scrupulously avoided. The normal salicylate of zinc occurs in glossy, satiny needles, having a sweet, somewhat styptic and bitter taste; it is very soluble in hot water, in alcohol, ether, and methylic alcohol. Its composition is $C_{14}H_5O_5ZnO + 3aq$, and it contains 23.95 per cent. of oxide of zinc. It has been employed as an antiseptic astringent in blennorrhagia, purulent ophthalmia, etc., the solution containing 0.5 to 4.0 grams of the salt to 100 grams of distilled water. A. J. Ph., April, 1878, p. 182; from J. de. Ph. et de Chim., 1878.

Salicylisulphite of Sodium.—C. Pavesi proposes to employ a compound of salicylic acid and sulphite of sodium in such affections where the use of either remedy would be indicated, chiefly for the reason that the resulting compound appears to be more soluble than either substance by itself, and because the salicylic acid retards the decomposition of the sulphite. To prepare it, he directs 1 p. salicylic acid and 2 p. sulphite of sodium to be dissolved in a sufficient quantity of water at 50°–60° C. (= 122°–140° F.). On cooling, the compound (or rather mixture) crystallizes out, having an opal-blue tint, and possessing the tastes of both constituents. The crystals are very soluble in water. New Rem., March, 1878, p. 83; from J. de Ph. d'Anvers, Jan. 1878.

Sulphosalicylate of Sodium.—Complaints have appeared in the medical journals that salicylate of sodium sometimes produces irritating effects when administered medicinally. J. Williams believes this to be due to the fact that the salicylic acid is not a pure homogeneous article, and that salicylate of sodium is very difficult to purify by crystallization. He believes he has found in sulphosalicylate of sodium a compound that will answer as a substitute for the salicylate, and which may readily be purified and obtained of definite constitution. To prepare it it is necessary that the salicylic acid should be pure. A mixture of 1 part by weight of pure salicylic acid and 2 parts of sulphuric acid is gently heated on a sand-bath up to about 100° C. (= 212° F.), when action will commence and considerable heat is developed. The beaker is removed from the sand-bath, and the contents stirred, so as to regulate and keep down the temperature; but the cooling must not be sufficient to altogether check the reaction. If the temperature exceeds the proper point, little or no sulphosalicylic acid is produced, but apparently bisulphocarbolic acid, which does not yield definite crystallizable salts. When the reaction has been properly maintained, at the end of ten minutes or a quarter of an hour the temperature begins to fall, and in a short time the whole becomes a solid mass, generally of a light-brown color; this will speedily deliquesce if left exposed to the air; but it can be dissolved in water at once, and treated with carbonate of barium in the usual way. Sulphosalicylate of barium, however, is not a very soluble salt, and it is, therefore, necessary to employ a considerable quantity of water, and to filter the liquid while still hot. This solution of the barium salt, decomposed by an equivalent quantity of sulphate of sodium, yields a solution of the sulphosalicylate of sodium, which upon evaporation to a small bulk yields crystals; these are pressed between paper, and purified by several recrystallizations. When pure, sulphosalicylate of sodium forms hard white prisms; it is not deliquescent, although very soluble in water. It is almost insoluble in alcohol, has no caustic, but a slightly bitter taste, and seems well adapted for medicinal use. With perchloride of iron it produces the dark purple coloration so characteristic of salicylic acid; proving that the salicylic acid radical is still intact in the compound. Yearbook of Ph., 1876, p. 595.

Nitrosalicylic Acid—Formation of Salicylic-aldehyde during its Formation.—T. L. Phipson has found that when salicylic acid is suspended in water to which nitric acid is added, it dissolves on heating with a deep-red color. A strong odor of the plant *Spirea ulmaria* is given off during the solution, and the author has found that a considerable quantity of salicylic aldehyde is, in fact, formed under these circumstances, and may be separated from the brown liquid, from which the nitrosalicylic acid has crystallized, by agitation with ether. On evaporating the ethereal solution salicylic aldehyde remains as a reddish, strongly odorous oil. J. Chem. Soc., Nov. 1877, p. 617.

Lactate of Sodium—Formula of the Pharm. Society of Paris.—Dilute a quantity of lactic acid with 3 p. of distilled water, saturate with bicarbonate of sodium, evaporate, and pour it into forms to solidify. A very deliquescent salt. The solution, evaporated to a syrupy consistence, deposits flattened prismatic crystals and star-shaped groups of needles. New Rem., Sept. 1877, p. 285.

Lacto-phosphate of Calcium.—In the "Transactions of the New York Odontological Society" is a paper on the artificial production of secondary dentine, by the use of lacto-phosphate of calcium over exposed dental pulps. The writer states that phosphate of calcium partially digested in lactic acid and applied in a more or less thick paste to an exposed dental pulp in the plasma is applied at once in the building up of secondary dentine, and the restoration of the lost part. If this is true there would seem to be nothing in the way of building up in this manner a whole tooth minus the enamel, and it would seem to be an exception to every law of nature, which demands that nutrition shall come by the way of the circulation. New Rem., Aug. 1877, p. 232.

Malic Acid—Determinations.—G. Papasogli and A. Poli recommend that the solution be treated with a little sulphuric acid and bichromate of potassium, and that it be then gently heated. In the presence of malic acid the odor of over-ripe fruit is then developed. Neither succinic nor citric acid produces this odor. Ph. Centr. H., Nov. 15th, 1877, p. 386.

Tartaric Acid—Preparation from Wine-lees.—Paul Müller draws attention to the utilization of the lees of certain Alsatian wines for the preparation of tartaric acid. One hectoliter of wine yields about 4 liters of lees, which yields from 4 to 20 per cent. of tartaric acid; the common wines yielding a lees richest in acid. The lees is first subjected to distillation, the product being utilized as alcohol or brandy. The residue is then treated with dilute muriatic acid, filtered, and the tartaric acid precipitated as calcium salt, which is further treated by well-known methods. Ph. Centr. H., Nov. 8th, 1877, p. 372.

Tartaric Acid—Detection in Citric Acid.—Cailletet recommends the following easy and practical method of recognizing the presence of tartaric in citric acid. It depends upon the fact that bichromate of potassium, in the cold, rapidly blackens tartaric acid, with disengagement of carbonic acid. Its action on citric acid, on the other hand, is very slow and results in imparting to it a coffee-colored tint. A cold saturated solution of bichromate of potassium is prepared. Into a test-tube 10 cc. of this solution and 1 gram of the acid to be tested are introduced, and the mixture is stirred for a moment with a glass rod. After 10 minutes, if the citric acid was free from tartaric acid, the mixture will show the orange color of the bichromate. If, however, 5 per cent. of tartaric acid were present, the mixture will have assumed a blackish-brown color, and in presence of only 1 per cent. it exhibits the color of an infusion of coffee. New Rem., Nov. 1877, p. 326; from Rép. de Ph. 1877.

Tartaric Acid—Determination.—A. Scheurer-Kestner, after criticizing various methods for determining the value of crude tartar, recommends the following method whereby the total tartaric acid as well as the quantity of tartrate of lime may be rapidly estimated. The sample is dissolved in hydrochloric acid, the filtered solution is neutralized with caustic soda, and then precipitated with chloride of calcium. All the tartaric acid is precipitated as tartrate of calcium. The preciptate is washed, calcined, and the carbonate of calcium obtained is titrated in the ordinary manner. If the tartar has been previously titrated with a standard alkaline liquid it is easy, from these two data, to calculate the respective quantities of bitartrate of potassium and neutral tartrate of calcium, but it is only possible when the sample is free from other acid products. Ch. News, May 31st, 1878, p. 227; from Compt. Rend., April 22d, 1878.

Grecian Tartar.—Until recently the lees of wine (katapatia) were thrown away in Greece, and thus thousands of kilos of tartrates lost. Prof. X. Landerer states, that in the last three or four years the lees, dried in the sun, have been exported to Italy, where they are converted into cream of tartar. This industry might be much enlarged were it not for the pernicious habit of the Greeks to "pitch" most of their wines, particularly those of the Peloponnesus, which makes the lees unsalable. A. J. Ph., April, 1878, p. 177.

Cream of Tartar—Analyses of Commercial Samples.—Clarence G. Stone has analyzed 12 commercial samples of cream of tartar, 10 of which were composed of bitartrate of potassium (92 to 96.4 per cent.), and tartrate of calcium (3.6 to 8 per cent.); while two samples were evidently adulterated, containing 21.7 and 32 per cent. of bitartrate of potassium, 61.6 and 64.3 per cent. of sulphate of calcium, and 16.7 and 3.3 per cent. of sulphate of potassium respectively. Of the ten samples of commercially pure cream of tartar examined, only one sample contained tartrate of calcium within the limits (5 per cent.) of the U. S. Pharm.; the other nine containing 5.4, 6, 6, 6.1, 6.3, 6.6, 6.9, 7.6, and 8 per cent. of tartrate of calcium respectively. The cream of tartar sold by druggists was found to be much better than that sold by grocers. New Rem., Sept. 1877, p. 274.

Tartrate of Potassium and Sodium—Presence of Ammonia.—E. Holderman has found commercial Rochelle salts, obtained from a reputable manufacturer, to contain an appreciable percentage (0.355 per cent.) of ammonia in form of chloride. He accounts for its presence by the method frequently pursued to purify cream of tartar, of dissolving the crude tartar in ammonia and precipitating it by means of hydrochloric acid. Indeed cream of tartar produced by the same firm was found to contain both ammonia and chlorine, and proved the author's view to be correct. While the presence of ammonia does not necessarily interfere with the efficacy of tartrates intended and used medicinally, it may interfere very materially when, as in an instance cited by the author, such preparation is applied to analytical researches. Arch. Ph., July, 1877, p. 44.

Citric Acid.—A. C. Wehrli, after reviewing the various sources of citric acid, gives the following tabulated result of the amount of citric acid found by him in the various fruits enumerated:

	Citric Acid in 1 fl. ℥ juice.	Citrate of Calcium in 1 pound.	Represents Citric Acid.	Percentage of the fruit.
Cranberries, .		72 grs.	56.6 grs.	0.80
Lemons, . . .	34.74 grs.	300 "	236 "	3.37
Limes, . . .	30 "	326 "	256 "	3.65
Sour oranges, .	10 "	128 "	100 "	1.43

The author gives the methods by which these determinations were made. Cranberries contain no other acid besides citric. An examination of six samples of citric acid, both of English and American manufacture, proved them to be quite pure. The Ph., May, 1878, p. 142.

Citric Acid—Reaction.—A. Sabanin and N. Laskowsky propose a method of determining the presence of citric acid, which is dependent on the following observation previously made by Sarandinaki and by Kämmerer: When citric acid and excess of ammonia (5 grams to 30 cc.) are heated in sealed tubes at 120° C. (= 248° F.) for six hours, a yellow coloration is observed, small crystals are deposited, and if the liquid on cooling is poured into an evaporating basin and allowed to stand for several hours it becomes blue, the crystals disappear and the color is intensified, and after several days becomes green. The latter change is slow if the solution is kept in the dark, and it appears blue by transmitted light. If the above mixture is heated to 160° C. (= 320° F.) no coloration takes place. The reaction occurs in the presence of oxalic (tartaric? Rep.) and malic acid, even when these acids are present in the proportion of 10 – 1 citric acid; but 10 milligrams at least of the latter must be present. For the testing of fruit juice the authors propose the following plan: The juice is mixed with alcohol, left for some hours and then filtered. Acetate of lead is added in excess, the precipitate collected, washed, and ammonia added in excess. The solution is then evaporated to get rid of ammonia, and treated with sulphuretted hydrogen. The sulphide of lead is filtered off, the sulphuretted hydrogen driven off, excess of acetate of barium is added, and the mixture heated. The precipitate is collected on a filter, washed, and decomposed with sulphuric acid. The supernatant liquid is then heated with ammonia in sealed tubes, as above stated. Ph. J. Trans., June 15th, 1877, p. 1008; fr. Zeitschr. Anal. Chem.

Citrate of Sodium and Potassium.—Th. Pusch recommends this double salt as a substitute for the deliquescent citrate of potassium, as well as the efflorescent citrate of sodium, the new compound being perfectly unchangeable on exposure to air. The author suggests its preparation as follows:

100 parts of citric acid are dissolved in a sufficient quantity of water, 108 parts of purified carbonate of potassium and 221 parts of crystallized carbonate of sodium are added, the solution filtered evaporated to the consistence of syrup on a water-bath, and placed in a cool cellar to crystallize. The prismatic crystals formed are drained on a funnel and dried on blotting-paper. The mother liquors may be evaporated on a water-bath, until, upon cooling, a solid crystalline mass is formed, which may be dispensed in form of powder. Arch. Ph., July, 1877, p. 47.

Aconitic Acid—Presence in Cane-juice.—Arno Behr has found aconitic acid $C_6H_6O_6$ ($O = 16$) in the juice of the sugar-cane, and he points out that it may correspond in the sugar-cane with the citric acid that accompanies the sugar in beet-root. J. Chem. Soc., Aug. 1877, p. 182; from Ber. d. Deut. Ch. Ges.

Oxalic Acid—Industrial Production of the Pure Acid.—Ed. Bohlig communicates the following method, whereby oxalic acid is obtained pure, cheap, and rapidly. Oxalate of potassium is produced by the well-known method of heating sawdust with solution of caustic potassa. The potassa solution having a concentration of 36° B., is heated to boiling, and sawdust is added until the mixture becomes thick. It is then heated for 2 to 2½ hours, and the mass is allowed to become partially cool. Water is now added to the still hot mass, in such quantity that, when cool, the liquor has a density of 40° B.; the greater part of the oxalate of potassium being insoluble in caustic lye of that density. The well-washed residue is crystallized, is dissolved in a large quantity of hot water, clarified, and decomposed by means of solution of chloride or sulphate of magnesium. The precipitated oxalate of magnesium is now thoroughly washed, heated in wooden tanks by means of steam with conc. hydrochloric acid until solution is effected, and the hot liquor transferred to earthenware vessels, in which the acid soon crystallizes. The crystals, after washing, require a single recrystallization for complete purification. Ph. Centr. H., Aug. 2d, 1877, p. 252.

Oxalic Acid—Action of Light on its Aqueous Solution.—In the course of an investigation into the physiological action of light upon minute organisms, Arthur Downes and Thomas P. Blunt observed that oxalic acid in solution of decinormal strength is entirely destroyed when freely exposed to sunlight for some time. A similar solution under parallel conditions, with the single exception that the tube was encased in an opaque material, remained to all appearances entirely unchanged. The destruction of the oxalic acid in the unprotected tube was so complete at the end of two months, when the solution was examined, that it had no action on litmus-paper, and gave no precipitate with chloride of calcium; the reaction of permanganate of potassium was so slight as to be scarcely appreciable. The authors propose to make the nature of the change the subject of future inquiry.* Ch. News, Dec. 28th, 1877, p. 279.

Oxalate of Ammonium.—G. Fleury has observed that a dilute solution of oxalate of ammonia—such as is used for volumetric determination—gradually undergoes decomposition, carbonate of ammonium being formed. The decomposition, in an instance observed by the author, was complete in the course of six weeks. Dilute solutions of oxalate of calcium are similarly decomposed. Arch. Ph., July, 1877, p. 95.

Oxalate of Iron.—According to A. Biteryst, this salt is best prepared by dissolving 200 grams of pure ferrous sulphate in 600 grams of distilled water, to which a few drops of sulphuric acid have been added, then dissolving 180 grams of purified oxalic acid in 1800 grams of distilled water, pouring the latter solution into the former, collecting the precipitate, washing and drying. The amount of ferrous oxalate produced is 125–130 grams. New Rem., Oct. 1877, p. 304; from Jour. de Ph. d'Anvers.

Sclerotic Acid.—In 1876 (see Proceedings, 1876, p. 119) Prof. Dragendorff had given some preliminary notices on the active constituents of ergot, being the results of investigations made by him in conjunction with Mr. Podwissotzky. Since then the authors have published, in "Arch. f. Experim. Pathol. und Pharmacol.," their results in detail. The most important of these is the discovery of the active principle, described in their previous paper, and named by them *sclerotic acid.* Although they have not succeeded in obtaining this principle in a chemically pure condition, by the following method it is obtained very nearly pure, and certainly sufficiently so for physiological purposes:

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* The observation that dilute solutions of oxalic acid are decomposed in time, has already been made by H. Werner (see Proceedings, 1873, p. 249), who does not, however, mention that exposure to light is necessary, occasional exposure to air being sufficient. He, moreover, found that weak solutions of other organic acids—succinic, tartaric, citric, and tannic—were also decomposed by such exposure, although not as rapidly.—REP.

Very finely powdered ergot is exhausted with distilled water, the solution concentrated in vacuo, and the residual liquid mixed with an equal volume of 95 per cent. alcohol. This causes the precipitation of a peculiar slimy substance, *scleromucin*, together with a portion of the salts and the greater part of the suspended fatty matter. The mixture having been allowed to stand on ice for 24 to 48 hours, it is filtered and the filtrate mixed with a further quantity of 95 per cent. alcohol, sufficient to precipitate all the sclerotic acid in combination with bases (chiefly as sclerotate of calcium). The separation of the precipitate is promoted by ice as before. This causes the deposited mass, which has a brownish color, to adhere firmly to the walls of the vessel, so as to permit the supernatant liquid to be poured off easily. The precipitate is kneaded with 80 per cent. alcohol, and immediately thereafter dissolved in 40 per cent. alcohol, when the remainder of the scleromucin and another larger portion of the foreign salts are left behind. This filtrate is now mixed with absolute alcohol, whereby sclerotic acid is precipitated in conjunction with certain bases and other substances. This impure product, when carefully dried over sulphuric acid, was found on analysis to contain 8.5 per cent. potassium, about 0.36 per cent. calcium, 4.3 per cent. sodium, 2.74 per cent. phosphoric acid, and 3.4 per cent. silicic acid, or altogether, 19.3 per cent. of ash. The greater part of these admixtures may be removed, and the sclerotic acid obtained free, by adding, before the final precipitation with absolute alcohol, a considerable quantity of hydrochloric acid (for every 100 cc. of solution, 5–6 grams of the acid, sp. gr. 1.100), allowing to stand at ordinary temperatures for a few hours, and then proceeding to precipitate. In this manner the amount of ash may be reduced to 3 per cent., and by repeated solution, addition of acid, and precipitation, it may be reduced to less than 2 per cent. A more complete purification is difficult and hazardous, because every addition of hydrochloric acid causes the decomposition of a small quantity of sclerotic acid, while at the same time a portion is lost by remaining in solution. Good ergot contains about 4 to 4.5 per cent. of the acid, although samples are met with which contain scarcely 1.5 to 2 per cent. The sclerotic acid produced, however, is always identically the same, and corresponds to the following character: Odorless, tasteless, slightly acid reaction in aqueous solutions, decomposing carbonate of calcium but slowly; boiling nitric acid of 1.200 sp. gr. produces a little picric and oxalic acid, together with a new substance, which assumes a bright yellow color on adding ammonia or other alkalies; more concentrated nitric acid converts it into picric, oxalic, mucic, tartaric, and aposorbic acids; not a glucoside, nor changed in effectiveness by additions of sulphuric or hydrochloric acids; the latter even apparently intensifying its effects; sparingly dissolved by boiling alcohol, insoluble in cold; affords precipitates with phosphomolybdic acid, and with tannin, but not with other precipitants for alkaloids; properly purified, is hygroscopic, but not deliquescent. It is present in Bonjean's and Wernich's preparations (ergotin, so-called), and also, in considerable quantity, in Wigger's osmazom, as well as in commercial extracts of ergot that are not prepared with too strong alcoholic menstrua. In Wigger's ergotin and in (strong?) alcoholic tinctures it is present only in traces or is entirely absent. New Rem., July, 1877; from Ph. Zeit. f. Russ., 1877.

Xanthate of Potassium.—B. Zöller strongly recommends the use of this compound for antiseptic purposes. Urine, grape-juice, blood, and other putrescible substances to which small quantities of this salt have been added have been found to remain undecomposed for months. Xanthate of potassium is prepared by mixing bisulphide of carbon with an alcoholic solution of potassa, and purifying the resulting salt by recrystallization from water. It forms colorless crystals, has the composition $KC_6S_2H_5O$ ($O=16$), and its solutions color the skin yellow. New Rem., June, 1878, p. 168.

Polyporic Acid.—A new organic acid occurring in nature (see Polyporus).

Tannins—Methods of Estimating.—H. R. Procter has made some comparative experiments with a view of testing the accuracy of the various methods that have been recommended for estimating tannins, and to point out, if possible, those which merit confidence.

1. *Müntz and Ramspacher's Method.*—This process consists in forcing a tannin infusion through a piece of raw hide, taking the sp. gr. before and after, and calculating the tannin from the loss (see Proceedings, 1876, p. 240). He had pointed out that the method

is liable to inaccuracy, because the raw hide also absorbs a large proportion of free acid in the infusion (see Ibid., p. 241), and now adds that it is extremely difficult to absorb the whole portion of tannin.

2. *Hammer's Method*, an older one, in which absorption by hide raspings takes the place of the raw-hide filter, is still more inaccurate; and Nickerson's proposed slight modifications are no improvement.

3. *Gelatin and Alum Method.*—Experiments made with pure tannin show that it is difficult to determine whether gelatin or tannin are in excess, with less differences than about four per cent. of total quantity employed. A solution of five grams gelatin pro liter was employed. The still older,

4. *Sir H. Davy's Method* of precipitating with gelatin, filtering, drying, and weighing, and reckoning four-tenths of the whole as pure tannin, has been so generally stated to be inaccurate, that the author has made no confirmatory experiments in support of these statements. Recently, however, the author has received information that the method is accurate if sufficient alum is used to coagulate the precipitate, and the author proposes to try this plan in future experiments.

5. *Fleck's Method.*—This depends on the fact that while tannin, gallic acid, and coloring matter are all precipitated by solution of acetate of copper, the two latter are redissolved by carbonate of ammonium. Fleck, therefore, proposed to employ a standard copper solution and to measure the excess by cyanide of potassium. Dr. Watts showed that this was impracticable, since some varieties of tannin gave precipitates which were more or less soluble in carbonate of ammonium, while some tannins might be measured gravimetrically with considerable accuracy. All tannins giving green precipitates with iron gave copper precipitates more or less soluble in ammonia. By reckoning the tannin as two-thirds the weight of precipitate, or twice that of cupric oxide left on ignition, fair technical results might be obtained, but it is unlikely that all the various tannins actually combine with copper in the same proportion. Another process which has been much recommended is,

6. *A. H. Allen's Volumetric Method*, with a standard solution of acetate of lead, using as indicator a mixture of ammonia and ferrocyanide of potassium. This process, in its original form, is

quite inadmissible, since lead precipitates gallic acid as well as tannin, and both react equally on the indicator. In combination with some of the differential processes in which tannin is removed by gelatin or hide-raspings, it may no doubt give useful results, and as the lead compounds of the different tannins are better known than most others, possibly factors might be calculated to give percentage results. But the author insists that any calculation of percentages by comparison with "pure" tannin is utterly fallacious, both because the various tannins are of totally different constitutions, and because really pure tannin is quite unattainable.

7. *Mittenzwey's Method*, afterwards also proposed by Terreil, depends on the oxidation of the tannin by the direct absorption of atmospheric oxygen in alkaline solution—a difficult and tedious proceeding, though doubtless capable of some accuracy in skilful hands.

8. *Monier's Method* depends on the direct oxidation by permanganate. but this proved quite impracticable, since the oxidation is rapid at first, and then slow, and with no definite termination. In the author's opinion,

9. *Löwenthal's Method*—with recent additions—constitutes the most practical method of tannin analysis yet discovered. He adds to the *very* dilute tannin infusion a considerable quantity of indigo, not only to act as an indicator, but to control the oxidation of the tannin. This reaction is both rapid and accurate, and combined with his process of precipitation by gelatin will give results strictly comparative for any single tannin material. The author gives the working details of this process, and refers for further particulars to Löwenthal's paper in the *Zeitschrift für Analytische Chemie* (1877, p. 33), and to an excellent paper by Neubauer abstracted in the *Journ. Chem. Soc.* (IX, 595). Of solutions the following are required for this method:

1. Four grams pure permanganate of potassium in three liters of distilled water (or half decinormal answers well and saves calculation).
2. Five grams of pure "precipitated indigo" in one liter of water (Woodroof Brothers, of Crutched Friars, supply a satisfactory article).
3. Dilute sulphuric acid (1 to 3 of water).
4. Twenty-five grams of good transparent glue, well swollen in

cold water, and then dissolved by the aid of heat. The solution is made up to a liter, and saturated with pure table salt.

5. A saturated solution of pure (table) salt, containing 25 cc. of sulphuric, or 50 cc. of hydrochloric acid per liter.

To make an analysis, 10 grams of sumach or valonia, or 20 to 25 grams of bark, are exhausted by repeated boiling with portions of water, and the infusion, when cold, made up to a liter. Of this infusion 10 cc. are mixed with, say, ¾ liter of good drinking-water, 25 cc. of the indigo solution and 10 cc. of the dilute sulphuric acid, are added, and then the permanganate solution is run in *drop by drop*, from the burette, with constant stirring, till the deep blue color of the indigo changes to a clear yellow; and the moment this takes place the quantity of permanganate is noted and designated A. Next the same process is repeated with indigo and sulphuric acid alone, and the quantity of permanganate consumed is noted, and designated B. Then subtracting B from A, the amount of permanganate consumed by the total astringents of 10 cc. of the tannin infusion is obtained. Both the tannin and indigo are, of course, oxidized by the permanganate; but as the tannin is the most readily oxidized of the two, it is consumed first, and when the indigo is all bleached it is a certain indication that the tannin is destroyed also. In order, however, to obtain this satisfactorily, the proportion of indigo should be such as to require about twice the quantity of permanganate which would be consumed by the tannin alone. Thus, if the indigo alone requires 10 cc. of permanganate, the indigo and tannin together must not take more than about 15 cc., and if it does so, the tannin infusion must be diluted to correspond, or a less quantity employed.

The next step is to ascertain the proportion of gallic acid and impurities in the sample. To this end 100 cc. of the infusion are mixed with 50 cc. of the salted gelatin solution, and then after well stirring, 100 cc. of the salt and acid solution, and the mixture is allowed to stand for some hours or all night, and then filtered—*perfectly clear*—through paper. If now 25 cc. of this filtrate are treated with permanganate and indigo in the same manner as the 10 cc. of original infusion before, the amount of permanganate required for the gallic acid and impurities alone is obtained, since the tannin has been entirely precipitated, and the gelatin has so trifling an action on the permanganate that it may be safely neglected. This quantity is deducted from that found to be consumed by the total astringents, and the amount of permanganate required for the *pure tannin* in 10 cc. of the infusion is then ascertained.

The method is applicable only for comparing one sample astringent substance with another of the same kind—oak bark with oak bark, valonia with valonia, etc., because the different species of tannin consume different proportions of permanganate; in the case of sumach, however, it will be quite safe to compare it with galls or pure tannin. Newbauer reckons 1 liter of decinormal permanganate as equal to 4.157 grams gallotannic acid; Oser states that 1.5 gram of oak-bark tannin consumes only the same quantity as 1 gram of gallotannic acid; hence 6.235 grams of oak-bark tannin require 1 liter of the decinormal solution. Ch. News, Aug. 10th, 1877, p. 58.

Tannins of the Oak, Willow, and Elm.—E. Johansen has made extensive investigations with the view of ascertaining the nature of the different tannin-like substances contained in the barks of the oak, willow, and elm. By a long and elaborate process, the different tannins were separated from the three barks in something like a pure state.

Oak tannin is a red brown, amorphous, glistening body, easily soluble in alcohol, slightly soluble in ether, and forms an imperfectly clear solution in water. In its behavior to litmus-paper, metallic salts, and alkaloids, it is completely analogous to gallotannic acid. Dried at 110° C. (= 230° F.), it lost 8 per cent. of water. On analysis it gives figures agreeing approximately with Wagner's formula = $C_{14}H_{16}O_8$. It contains also 0.77 per cent. of nitrogen and 0.13 per cent. of ash.

Willow tannin consites of a brown-red amorphous body, with a slightly astringent taste; easily soluble in alcohol, slightly soluble in ether, and forming a thick solution in water. With ferric salts it gives a deep-black color, turned violet red by alkalies. It precipitates mercuric nitrate and chloride, and zinc and copper sulphates, as well as albumen, starch, and alkaloids. At 120° C. (= 248° F.) it lost 10.70 per cent. of water, and on analysis gave 51.13 C., 4.78 H., and 44.09 O. It also contains 1.88 per cent. of nitrogen, and 1.63 per cent. of ash.

Elm tannin.—In appearance and solubility this variety resembles oak tannin. With ferric chloride, it gives a dirty-green precipitate, turned violet red by hydrate of sodium. With ferrous sulphate, it gives a pure green precipitate. It precipitates lead and copper acetates, and zinc sulphate after some time. With zinc chloride, mercuric nitrate, calcium acetate, etc., it gave the usual reactions. At 110° C. (= 230° F.) elm tannin loses 3.32 per cent. of water, and, on analysis, gives 44.54 of C., 4.72 of H., and 50.74 of O., besides containing 1.21 per cent. of ash.

The salts of these three tannins with lead, copper, and tin were next examined, and the results are detailed, as are also those obtained by the action of various agents upon the tannin, such as dilute acids, melting hydrate of potassium, etc. The author had hoped to ascertain whether the different tannins were analogous or even identical. A. J. Ph., Sept. 1877, p. 453; from J. Chem. Soc. Arch. Pharm., 1877.

Tannic Acid of Wines (*Œnotannic Acid*).—The difficulty of obtaining the tannin present in wines in a pure condition, has prevented its study beyond the most superficial reactions, and these relate only to the acid as it exists in the wine. A. Gautier has now succeeded in obtaining the acid in a pure and crystalline condition. The first step in the process is the removal of the coloring matter. To this end the wine is neutralized with dilute solution of soda, an excess of which is carefully avoided. The coloring matter is then completely precipitated by adding 15 per cent. of muriate of ammonia. The liquid, so deprived of the coloring matter, is now treated with recently precipitated carbonate of copper, decanted after two days, and the precipitate is washed rapidly—and with exclusion of the air—with dilute alcohol containing carbonic acid. The washed mixture of tannate of copper and excess of carbonate of copper is suspended in water, decomposed by sulphhydric acid, heated to 100° C. (= 212° F.), and filtered. The nearly colorless (faint rose red) filtrate is evaporated in vacuo, the residue dissolved in ether, and the solution evaporated spontaneously under a bell jar, filled with carbonic acid, over sulphuric acid.

Œnotannin, so obtained, is colorless, or but faintly rose red, has an astringent taste, is soluble in water, alcohol, and ether. It is precipitated with difficulty from its aqueous solution by gelatin, is browned by alkalies, not changed by ferrous salts, precipitates the ferric salts with a bottle-green color, and precipitates acetate of zinc and the salts of lead and mercury. It reduces silver salts in the presence of ammonia when heated. Alkaline salts of copper are not reduced until the tannin has been boiled for a long time with dilute acid, when the reaction becomes very decided. In its relation to ferric salts it approximates to morintannic, catechutannic, and cinchotannic acids.

When a solution of œnotannin is exposed to the air, it soon acquires a rose-red color, which changes to brown red, and it then becomes insoluble. The characters of the rose-red modification correspond very nearly, or are almost identical with those of a red coloring matter of wine, while the red brown, insoluble modification, is best compared to the brown matter of the wine-yeast. This seems to indicate, with comparative certainty, that the red coloring matter of wines is nothing further than an oxidation product of œnotannin. It is also the opinion of the author that neither the tannins nor the coloring matters are identically the same in all wines, although they correspond very closely in their characters. Zeitschr. Œst. Ap. Ver., Sept. 1st, 1877, p. 407.

Catechin—Preparation, etc.—Karl Etti prepares catechin by dissolving catechu in eight times its weight of boiling water, straining the liquid through a cloth, and leaving it to stand for some days till the insoluble catechin has subsided. It is then collected on a linen cloth, and submitted to the action of a screw press. The crude catechin is then dissolved in a sufficient quantity of dilute alcohol, and the solution filtered. It is next shaken up with ether as long as any catechin is dissolved, and after the ether has been removed by distillation, the residue is taken up with distilled water, and the solution is left for a few days, when the catechin crystallizes out in an almost colorless state. After pressure in a cloth it is again dissolved in boiling water, when a yellowish-white body remains as residue, which is said to be quercetin. The catechin obtained precipitates albumen but not gelatin. It does not expel carbonic acid from carbonate of barium at a boiling heat, but on long-continued boiling a small quantity of CO_2 is set free, because the catechin is converted by long boiling into a new compound, which has the power of expelling CO_2 from carbonates. By treatment with fused caustic potassa, catechin yields protocatechuic acid and phloroglucin.

Catechin red (the so-called catechutannic acid), may be obtained from the intensely red liquid remaining in the above process for catechin after shaking with ether. The liquid is evaporated, when a red precipitate forms, which may be freed from inorganic bodies by hydrochloric acid. J. Chem. Soc., Oct. 1877, p. 488; from Liebig's Annales, v. 186.

Catechin.—According to Arm. Gautier commercial gambier—the dry extract of the leaves of *Uncaria Gambier*, occasionally mistaken for catechu—contains three distinct catechins. To obtain them, the gambier is powdered, exhausted with cold water (to remove the tannin-like body, which is in preponderance), and the residue is then crystallized from boiling water. The mass is then dissolved in diluted alcohol and treated with acetate of lead until the precipitate appears yellow. The mixture is then filtered, the alcohol distilled off partly in a current of carbonic acid, the excess of lead is removed by sulphuretted hydrogen, and three-fourths of the liquid is again distilled off in a current of carbonic acid. On cooling, *catechin* (*A*) crystallizes out, and is perfectly white; it is washed with boiled water and dried. The liquid is now again evaporated to two-thirds, when, on cooling, *catechin* (*B*) crystallizes out. This differs from (*A*) in composition, solubility, and melting-point. Finally the mother liquor is evaporated to a syrupy consistence, when a third product, consisting of an oily body and a crystalline *catechin* (*C*), is obtained. These three catechins must be rapidly washed with previously boiled cold water, on a filter free from lime, and dried in a vacuum, or in an atmosphere of carbonic acid below 50° C. (= 122° F.). From 1 kilogram of gambier, the author obtained 150 (*A*), 20 (*B*), and 6–7 grams (*C*). (*A*) has the formula $C_{40}H_{38}O_{16}+2H_2O$, forms small oblique rhombic prisms, melts at 204°–205°C. (= 399.2°–401°F.), and is soluble in about 10 p. of water; (*B*) has the formula $C_{42}H_{38}O_{16}+H_2O$, and melts at 176°–177° C. (= 348.0°–350.6° F.). (*C*) has the formula $C_{40}H_{38}O_{16}+H_2O$, forms very fine needle-shaped crystals, melts at 163° C. (= 325.4° F.), and requires about 20 p. of water for solution. All of them lose their water of crystallization at 120°–130° C. (= 248°–256° F.). When anhydrous, (*A*) and (*C*) are identical in composition, but are nevertheless different. Ph. Centralh., June 27th, 1878, p. 236; from Chem. Centralbl.

ALKALOIDS.

Alkaloids—Reactions.—R. Godeffroy has observed the following reactions:

1. Ferric chloride dissolved in muriatic acid produces with not too dilute solutions of alkaloids in the same acid:

Yellowish-red Precipitates:	*Precipitates Soluble in Excess:*	*No Precipitates:*
Aconitia, piperina, strychnia, veratria.	Atropia, quinia, cinchonia.	Brucia, caffeia, morphia.

The precipitates contain one molecule of ferric chloride, combined with two molecules of the alkaloidal hydrochlorate. The quinia double salt may be obtained in small prisms by evaporating the acid solution, is freely soluble in water and alcohol, and possesses a bitter and inky taste.

2. Trichloride of antimony dissolved in muriatic acid, with solutions as before:

Precipitates from rather Dilute Solutions:	*From Concentrated Solutions:*	*No Precipitates:*
Aconitia, quinia, cinchonia, conia, piperina, strychnia, veratria.	Atropia, nicotina, solania.	Caffeia, morphia.

The precipitates are white (with piperina yellow), soluble in dilute muriatic acid, and decomposed by water.

3. Solution of stannous chloride, with solutions acidulated with muriatic acid:

Precipitates from Dilute Solutions:	*From Concentrated Solutions:*	*No Precipitates:*
Aconitia, atropia, brucia, quinia, cinchonia, codeia, conia, morphia, piperina, solania, strychnia, veratria.	Nicotina.	Caffeia.

The precipitates are white and crystalline, slightly soluble in water; less in acidulated water. The solution of caffeia with stannous chloride in muriatic acid yields, on evaporation, crystals of the double salt. Am. J. Ph., Aug. 1877, p. 399; from Arch. Phar.

Opium Alkaloids—New Reaction.—David Lindo finds that if a little *codeia* is placed in a very small dry test-tube, dissolved in concentrated sulphuric acid *without heat*, and a drop of solution of perchloride added, the latter will float on the surface of the mixture without giving rise to any characteristic color; but on applying a gentle heat, the fluid acquires an intense blue color, very similar to that produced by ammonia with salts of copper. The tube should not be more than one-fourth full. *Morphia* treated in the same way gives rise to an intense *indigo-blue* coloration. Seen by candlelight these colors appear violet. On adding water to either of the solutions the blue color disappears. The fluid acquires a yellowish-red color, which is deeper with morphia than codeia. In its concentrated conditon it remains unchanged for days if the fluids are kept in test-tubes; but, owing to the absorption of moisture, it gradually changes on the surface. Very small quantities of the alkaloids should be used, as the color is very intense. Chem. News, April 18th, 1878, p. 158.

Prof. How has made the following reactions precisely in the way detailed by Mr. Lindo.

Papaverina dissolves in sulphuric acid to a pale purple fluid, which becomes very pale and then brownish on standing about an hour. The addition of ferric chloride and warming cause the purple color to change quickly to yellow, while the liquid becomes turbid. The addition of water gives a colorless liquid, becoming pale yellow the next day.

Narcotia dissolves to a bright-yellow liquid, becoming orange on standing about an hour. Then, treated as above, a blood red is produced, soon assuming a purplish tinge, then a bright red, resembling ferric sulphocyanide, and remaining permanent at least for a fornight.

Cotarnia gives first a clear, dark brownish-yellow solution; then, with ferric chloride, a whitish precipitate, dissolving to a dark-red fluid, which, with water, assumes much of the color obtained with narcotia, but, perhaps, paler. It is equally permanent.

Narceia dissolves to an orange liquid, which becomes turbid and purplish and finally of a pale red color.

Strychnia dissolves to a colorless fluid, and affords successively a clear yellow and colorless liquid.

Brucia gives at first a pale amethystine solution; then orange yellow, or red yellow, looking across the tube, and red on looking down it. On further solution (dilution? Rep.) an amethystine red, becoming pale, but still distinct, at the end of a fortnight.

Caffeia gives successively a colorless, a bright yellow, and a colorless fluid.

Piperin dissolves to a deep red, nearly black fluid, with a flocky deposit on heating with ferric chloride. The addition of water gives a yellow fluid, the deposit appearing dark brown. The fluid was nearly colorless the next morning.

Batulin gives a dirty green-brown fluid, becoming clear and colorless with water.

Coumarin gives an orange-yellow clear fluid, which water renders very pale yellow.

Phloridzin dissolves to a blood-red liquid, which is orange-colored at first, if very little of the substance is used. Water gives a small flocky precipitate, and leaves the solution of an orange color.

Quinia, *sulphate*, of commerce, dissolves to a pale yellow fluid, which turns deeper yellow when warmed with ferric chloride, and colorless with water.

Cinchonia, impure, gives clear yellow, turbid yellow, and yellowish liquids.

Beburin (*Bebeeria?* Rep.) *sulphate*, in brown scales, dissolves to a very dark liquid, becoming red with more sulphuric acid. With ferric chloride and warming, a dark green fluid—as seen over white paper—is produced, which gives with water a dirty yellow liquid. Ibid., June 14th, 1878, p. 244.

Morphia—Determination of very small Quantities.—G. Pellagri recommends the following method: The substance, dried if necessary by gentle heat, is dissolved in concentrated hydrochloric acid, a small quantity of pure concentrated sulphuric acid is added, and the mixture is evaporated on an oil-bath at 100° to 120° C. (= 212° to 248° F.). A purple coloration is produced, which is readily recognized, even in the presence of carbonaceous matter. After the evaporation of the hydrochloric acid a second quantity is added, the solution is neutralized with bicarbonate of sodium, upon which a violet color is produced, which is not changed by exposure to the air and which does not yield anything to ether. If now a few drops of a solution of iodine in hydriodic acid are added, the violet color changes to green, and the green body is then soluble in ether with a purple color. The reaction is dependent on the formation of apomorphia. *Codeia* gives the same reaction, but it may be separated from morphia by ether. *Brucia*, treated in the same manner, gives, upon the neutralization with bicarbonate of sodium, a blue color, which changes to red on the addition of iodine; but the latter reaction is not very delicate. Ph. Central. H., Nov. 22d, 1877, p. 397.

Morphia—Husemann's Test.—Prof. Albert B. Prescott reports some investigations relating to Husemann's test for morphia, that were made in the laboratory of the School of Pharmacy of the University of Michigan. This test, as given in "Husemann's Pflanzenstoffe" (1871), p. 124, is as follows:

"When morphia or one of its salts is exposed to the action of concentrated sulphuric acid for 12 or 15 hours at the ordinary temperature, or for half an hour at 100° C., or for a very short time at 150° C., there occurs (after cooling) a faint violet-red color. If now (in the cooled solution) there be added a drop of nitric acid, or chlorine water, or ferric chloride solution, or solution of chlorinated soda, or chlorinated lime, or a fragment of potassium nitrate or potassium chlorate, there is produced a beautiful blue to violet-red color, soon passing into a dark red. The one-hundredth of a milligram of morphia enables this color to appear with distinctness."

In the present investigations, which were mainly made by H. S. Wyman, it was found on treating purified morphia with purified sulphuric acid at 100° C. (= 212° F.), for half an hour, that a pink-red color was in each case obtained, but that the least quantity of morphia giving the reaction distinctly was one-fiftieth of a milligram. In each case, after so treating the morphia and allowing the solution to cool, the addition of a drop of nitric acid gave a beautiful blue to violet-red color, soon changing to orange dark-red color, from which the orange faded out. This test, also, appears to be distinct only with quantities down to one-eighteenth of a milligram.

Experiments made on *narcotina*, with hot concentrated sulphuric acid alone, gave the same reaction that morphia does; but in Husemann's test, the color given by narcotina was bright-pink red or carmine, the limit being found at about one-fiftieth of a milligram of the alkaloid.

Codeia, treated with pure sulphuric acid as above, gave a blue-purple color, which was little changed by the addition of a drop of nitric acid (after cooling), the color being blue or violet red (coinciding with that of morphia).

Narceina was found to give very little color, either with sulphuric acid alone or with Husemann's test. A. J. Ph., Oct. 1877, p. 490.

Hydriodide of Morphia.—Pelletier had found this compound, prepared by dissolving morphia in hydriodic acid, to be a white, silky, glistening salt, and freely soluble in water, while Winkler, who had prepared it by double decomposition between iodide of potassium and acetate of morphia, found the salt to be very sparingly soluble. E. Schmidt has now determined that the compounds obtained by either method are absolutely identical in their composition, crystalline form, solubility, etc. Both compounds crystallize in long, silky, glistening, rosette-like groups of needles, which have the composition $C_{17}H_{19}NO_3HI + 2H_2O$ ($O = 16$). The two molecules of water of crystallization are driven off at 100° C. (= 212° F.), but are again absorbed completely on exposure to air. They are sparingly soluble in cold, but more readily in hot water.

Hydrobromide of Morphia has also been prepared by the author, and its character and composition determined. Prepared by dissolving morphia in hydrobromic acid, the salt crystallizes similarly to the hydriodide, in dense tufts of long, white needles. Its composition is $C_{17}H_{19}NO_3HBr + 2H_2O$ ($O = 16$), and it also loses its two mol. of water of crystallization at 100° C. (= 212° F.). In its solubilities it ranges itself nearer to the hydrochlorate than does the hydriodide. Arch. Ph., July, 1877, p. 42.

Apomorphia.—Patrouillard found apomorphia of English manufacture to be a voluminous powder of gray color, intermixed with blackish granules. Under the magnifying glass it appeared as glossy scales. It has a slightly bitter taste, is soluble in water, alcohol, and ether, and is colored dark red or violet by nitric acid, the color becoming gradually lighter and the mixture sticky, but thin again and brown on the addition of ammonia. Ferric chloride colored it rose red, the color changing to violet and finally black. The aqueous solution yields with solution of iodine a red precipitate, which dissolves on heating and colors the solution red, afterwards brown. The aqueous and alcoholic solutions of the alkaloid are at first colorless, with a grayish tint, but on exposure to the air become greenish and finally emerald green. A. J. Ph., May, 1878, p. 259. Jour. de Ph. et de Chim., 1877.

Narceia.—The Pharm. Society of Paris has adopted the following method for obtaining this alkaloid: To the mother-water left after the crystallization of morphia and codeia from opium liquors (Gregory's process), ammonia is added, which causes a precipitate of narcotia, thebeia, and a resinous matter. To the filtered liquid a solution of acetate of lead is added, whereby a new precipitate is produced. After filtration an excess of sulphuric acid is added to remove the lead from the filtrate; the latter is neutralized with ammonia and is cautiously evaporated until a pellicle forms. On cooling a crystalline deposit forms, which augments by standing. This, when thrown on a strainer, washed with cold water, and then boiled in a sufficient quantity of water to dissolve it, furnishes, on cooling, silky crystals of narceia. These crystals are again dissolved, decolorized with animal charcoal, and recrystallized. Finally, they are treated with ether, to separate any accompanying meconin. Narceia appears thus in form of fine prismatic needles, slightly soluble in cold water or alcohol, more soluble in boiling water, very soluble in boiling alcohol, and almost insoluble in pure ether. It fuses at 145° C. (= 293° F.). It does *not* reduce iodic acid, and is not colored blue by ferric salts. A solution of iodine, 2 p. in 1000, strikes a fine blue color with it. New Rem., Aug. 1877, p. 254.

Narceia, Narcotia, and Oxynarcotia.—In continuation of their studies of the "opium alkaloids," C. R. Alder Wright and G. H. Beckett have determined a community of "structure" between the alkaloids narceia and narcotia, and both have been found to be closely related to a new alkaloid, *oxynarcotia*, recently separated from the crude narceia obtained from the mother liquors of the Robertson-Gregory morphia extraction process by Messrs. Macfarlan, of Edinburgh. From each of the three bases, by appropriate means, the bibasic acid, *hemipinic acid*, can be prepared, narcotia giving rise to the nearly correlated *opianic* acid by an intermediate reaction. This latter, however, is not producible from either of the other two alkaloids. A lengthy research has been made on the nature of the reactions undergone and the products furnished by hemipinic acid, with the result of completely establishing that this acid is a benzin derivative, and that, moreover, it is a carboxylated protocatechuic acid. In the course of this research it has also been demonstrated that *vanillin*, the odorous principle of vanilla, can be manufactured from narcotia. (See Vanilla.) Narcotia, oxynarcotia, and narceia, besides having considerable community of "structure," resemble one another, and differ from most other alkaloids in the ease with which these compounds with acids break up in presence of water into free acid and a basic salt. The amount of acid retained in these basic salts seems solely to be influenced by the amount of water present relatively to the acid, no definite basic compound being obtainable. Yearbook of Ph., 1876, p. 516.

Cinchona Alkaloids.—In 1873 O. Hesse communicated an extensive review of the "cinchona alkaloids," an abstract of which was embraced by the "Report" for 1875 (see Proceedings, 1875, p. 396). He has recently communicated to the German Chemical Society (Ber. d. Deut. Chem. Ges., 1877, pp. 2152–2162) a second and more complete paper on the same subject, which, as abstracted by L. v. Cotzhausen for Am. Jour. Pharm. (June, 1878, p. 299), is reproduced here:

Quinia, $C_{20}H_{24}N_2O_2$ ($O = 16$). Precipitated by ammonia or soda, it is amorphous and anhydrous, but soon combines with $3H_2O$, forming small crystals. Both the anhydrid and trihydrate are readily soluble in ether, which, on slow evaporation, yields some fine white needles. The balance, at first amorphous, becomes crystalline after some time. The ethereal solution sometimes gelatinizes suddenly from the separation of quinia, which is then less freely soluble in ether, requiring at 15° C. (= 59° F.) for 1 part of anhydrous quinia 16 to 25.5 parts of ether to effect solution. The anhydrid fuses at 177° C. (= 348.8° F.); the trihydrate at 57° C. (= 132.8° F.). The former dissolves in hot water, without fusing, and on cooling separates in needles. The trihydrate fuses in boiling water, and on cooling does not crystallize. A solution of quinia in an excess of diluted H_2SO_4 has a blue fluorescence, while with a solution in diluted HCl this is not the case. The fluorescence disappears also upon the addition of other substances, notably of chlorides. Quinia solution turns polarized light to the left. Chlorine and ammonia in excess cause a green coloration (thalleiochin). The neutral sulphate $2C_{20}H_{24}N_2O_2.SO_4H_2 + 8H_2O$ is efflorescent. The medicinal salt should contain 15.3 per cent. water of crystallization $= 7\frac{1}{2}H_2O$.

Quinidia (conchinin), isomeric with quinia, but rotating to the right, was discovered by Van Heijningen. It crystallizes from alcohol, with $2\frac{1}{2}H_2O$ in efflorescing prisms; from ether, in rhombohedrons, with $2H_2O$; from boiling water, in delicate plates, with 1½H_2O. In the two latter forms it does not effloresce at the ordinary temperature. The salt mostly met with in commerce has the formula $2C_{20}H_{24}N_2O_2$, $SO_4H_2 + 2H_2O$.

Quinicia, $C_{20}H_{24}N_2O_2$.—By heating the sulphate or other salt of quinia or conchinia until melted it is transformed into sulphate (or other salt) of quinicia without losing weight. Quinicia is amorphous, right-rotating, and is never present in cinchona bark.

Diconchinia, $C_{40}H_{46}N_4O_3$, the principal constituent of chinoidin, is amorphous, fluoresces in sulphuric acid solution, like quinia and quinidia; gives a green coloration with chlorine and ammonia in excess, and is right-rotating. It does not yield quinicia, and has not yet been converted into quinidia.

Cinchonidia, $C_{20}H_{24}N_2O$, first observed by Henry and Delondre (1833), again discovered by Winkler (1844) as quinidia, and subsequently called quinidia by Kerner, crystallizes from alcohol in shining prisms, rarely in delicate white needles or plates, the crystals being anhydrous. Its solutions rotate to the left, are not fluorescent and not colored green by chlorine and ammonia. The sulphate has the formula $2C_{20}H_{24}N_2O$, $SO_4H_2 + 6H_2O$, and is nearly insoluble in chloroform, but swells with it to a jelly-like mass.

Cinchonia, $C_{20}H_{24}N_2O$ (isomeric with cinchonidia), crystallizes from hot stronger alcohol in shining anhydrous prisms. Its solutions are dextrogyre, and show no fluorescence. The sulphate $2C_{20}H_{24}N_2O$, $SO_4H_2 + 2H_2O$ crystallizes from water in compact prisms.

Cinchonicia, $C_{20}H_{24}N_2O$, anhydrous monobasic sulphate of cinchonidia or cinchonia, heated to 130° C. (= 266° F.), or until they melt, are transformed into sulphate of cinchonicia. The alkaloid is right-rotating, is amorphous and never present in cinchona barks. Some salts are crystallizable.

Dicinchonia, $C_{40}H_{48}N_4O_2$ may be expected in the chinoidin of such barks which contain a large percentage of cinchonidia or cinchonia. As yet it has not been obtained entirely free from diconchinia.

Homocinchonidia, $C_{19}H_{22}N_2O$ (Koch's cinchonidia, 1877), crystallizes from strong alcohol in large prisms and from diluted alcohol in scales, and deviates the plane of polarized light to the left. The sulphate, $2C_{19}H_{22}N_2O,SO_4H_2 + 6H_2O$, crystallizes in very delicate needles, which have a gelatinous aspect, and while still moist melt at about 30°C. (= 86° F.); when carefully dried it resembles magnesia in appearance, is usually anhydrous, and in this condition swells with chloroform to a jelly-like mass. The *cinchovatina* (*aricina*) of Winkler, from Cinch. ovata, is mainly this alkaloid.

Homocinchonia, $C_{19}H_{22}N_2O$, is probably identical with Skraup's (1877) *cinchonia*, and appears to be present in the bark of Cinch. rosulenta.

Homocinchonicia, $C_{19}H_{22}N_2O$, an amorphous alkaloid, is formed when the anhydrous monobasic sulphate of homocinchonidia is melted. Its oxalate, $2C_{19}H_{22}N_2O, C_2H_2O_4 + 4H_2O$, greatly resembles the corresponding salt of cinchonicia.

Dihomocinchonia, $C_{38}H_{44}N_4O_2$, is amorphous, rotates strongly to the right, yields amorphous salts, and is also present in the bark of Cinch. rosulenta.

Quinamina (*Chinamin*), $C_{19}H_{24}N_2O_2$, discovered by the author (1872) in the bark of C. succirubra, grown at Darjeeling, and subsequently in all barks of the same species from British India and Java, in Mutis's Quinquina rouge, and in the bark of C. nitida, C. erythrantha, C. erythroderma, C. rosulenta, C. calisaya var. Schuhkrafft, and C. calisaya, known in English commerce as Para bark. It is separated from the amorphous alkaloids by precipitating the dilute acetic-acid solution with potassium sulphocyanide until the liquid is pale yellow; when clear it is supersaturated with ammonia, agitated with ether, the ethereal solution evaporated, and the residue crystallized from hot diluted alcohol; the mother liquor retains the balance of the amorphous bases. The author regards his first formula, $C_{20}H_{26}N_2O_2$, as incorrect.

Conquinamina, $C_{19}H_{24}N_2O_2$, is present with the preceding in C. succirubra and C. rosulenta, and perhaps in all barks mentioned above. It crystallizes in long shining prisms, which melt at 123° C. (= 253.4° F.), while quinamina melts at 172° C. (= 341.6° F.). It is more powerfully dextrogyre than quinamina, and, like it, is precipitated by chloride of platinum only from concentrated solutions, and it yields with chloride of gold a yellow precipitate, changing to purple, and with hydriodic acid a salt crystallizing in handsome prisms.

Quinamidina, $C_{19}H_{24}N_2O_2$, an amorphous alkaloid, is formed when quinamina is boiled for some time with diluted H_2SO_4; it is precipitated from an acid solution with difficulty by ammonia, more easily by soda, and is easily soluble in ether. With HCl it forms prismatic crystals, sparingly soluble in water, and with chloride of gold a yellow amorphous precipitate, soon turning purple.

Apoquinamina, $C_{19}H_{22}N_2O$, is isomeric with homocinchonidia, and is formed by the action of concentrated HCl on quinamina and conquinamina ($C_{19}H_{24}N_2O_2—H_2O = C_{19}H_{22}N_2O$). It is a white amorphous powder, very soluble in ether, alcohol, and in diluted HCl. The chlorhydrate is amorphous; chloride of platinum causes a yellow amorphous precipitate; chloride of gold gives a similar precipitate, which does not turn purple.

Quinamicina, $C_{19}H_{24}N_2O_2$, is formed when quinamina and probably also conquinamina, in form of sulphate, is heated to 100° C. (= 212° F.). The residue is dissolved in cold water, precipitated by bicarbonate of sodium, and the alkaloid freed from quinamidina by repeated solution in acetic acid and precipitation with bicarbonate. Quinamicina is a white amorphous powder, which fuses between 95° and 102° C. (= 203° and 215.6° F), is slightly dextrogyre and freely soluble in ether and in diluted H_2SO_4; the latter solution yields yellow precipitates with the chlorides of platinum and of gold.

Protoquinamicina, $C_{17}H_{20}N_2O$, is formed, like the preceding, by raising the temperature to above 100° C. (= 212° F.), preferably to between 120° and 130° C. (= 248° and 266° F.). The sulphate is nearly insoluble in cold water. The alkaloid is insoluble in ether, but dissolves readily in acetic acid, forming a brown solution, from which it is precipitated by ammonia or bicarbonate of sodium, in light-brown flakes, becoming black brown on drying.

Paricina, $C_{16}H_{18}N_2O$, found with quinamina in red bark, from Darjeeling; it is at once precipitated by bicarbonate of sodium from dilute solutions, and forms a pale yellow amorphous powder, soluble, with a yellow color, in ether, when fresh, and yielding amorphous salts; chloride of gold causes a muddy yellow precipitate, which will not turn purple.

Paytina, $C_{21}H_{24}N_2O+H_2O$, contained in the white cinchona bark of Payta; it crystallizes in beautiful prisms, and has the same reaction with chloride of gold as quinamina, conquinamina, and quinamidina; it differs from them, however, in being easily precipitated by chloride of platinum. Paytina is left-rotating.

Paytamina is the amorphous alkaloid present with paytina in the above bark; it is easily soluble in ether, is colored purple by chloride of gold, and precipitated by chloride of platinum.

Cusconia, $C_{23}H_{26}N_2O_4+2H_2O$, crystallizes in small plates; was discovered by Leverköhn in Cusco cinchona, and differs from all other cinchona alkaloids by forming an amorphous, jelly-like sulphate with H_2SO_4, which is not dissolved by adding more acid. Its acetate and other salts are likewise gelatinous.

Aricina, $C_{23}H_{26}N_2O_4$, is found in the same bark as cusconia; it was discovered by Pelletier and Coriol, crystallizes in white, shining prisms, which melt at 188° C. (= 388.4° F.), rotates to the left, like cusconia, and forms salts, which are sometimes gelatinous, but are more characterized, particularly the binoxalate and acetate, by their sparing solubility.

Cusconidina, also a constituent of Cusco bark, is precipitated from solutions in acids in pale yellow amorphous flakes, which after being washed, form a loosely coherent mass, become denser on drying in air, and ultimately melt together. Its composition has not yet been determined.

Javanina was isolated by the author from the so-called amorphous bases of Java calisaya bark. It separates from water slowly in rhombic scales, is very easily soluble in ether, without crystallizing on evaporation, dissolves in dilute sulphuric acid with an intense yellow color, and yields with oxalic acid a neutral salt crystallizing in scales.

Another alkaloid was observed in young calisaya bark from Bolivia; it is liquid, produces a greasy stain upon paper, and has a penetrating odor reminding of quinolina.

Other derivatives are the *hydrocinchonins* and the bases obtained by Zorn by acting with highly concentrated muriatic acid upon the four more common cinchona alkaloids.*

Cinchona Alkaloids—Distinction by Means of the Microscope.—Dr. Richard Godeffroy and C. Ledermann have contributed a very interesting paper on the distinction of the alkaloids of the cinchona barks by the aid of the microscope. After referring to the confusion existing (in Europe) in the nomenclature of the cinchona alkaloids, the authors refer particularly to the method of Stoddart and Schrage for their microscopic examination, whose method is based upon the peculiar and distinctive crystalline forms which appear when saturated solutions of the alkaloid and concentrated solutions of sulphocyanide of potassium are brought in contact under the microscopic lens. Schrage even recommends a solution of the difficultly soluble alkaloids saturated at a temperature 10° C. (= 18° F.) higher than that of the atmosphere. According to the authors this is wrong, since in the manner stated microscopic pictures are obtained which are at variance with the appearance of the reaction. The preparations used by them were the pure sulphates of the four alkaloids—*quinia*, *quinidia* (*conchinia*), *cinchonia*, *cinchonidia*—manufactured by Merk, of Darmstadt. Of each a saturated aqueous solution was made, and filtered only when needed for the microscopic examination. When a drop of the filtrate is placed upon a glass slide, and mixed with a drop of the solution of sulphocyanide of potassium, a white turbidity is at once produced, which is faintest when sulphate of quinia is used. Examined under the microscope with a magnifying power of 110 diameters, the following is observed:

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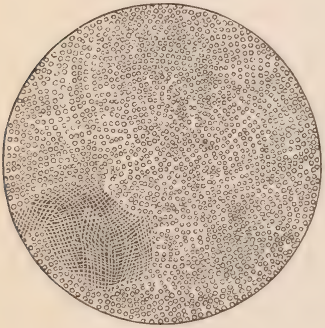
* The author states that *Pasteur's cinchonidia* consisted of nearly 2 parts of Winkler's quinidia and 1 part of Koch's cinchonidia.

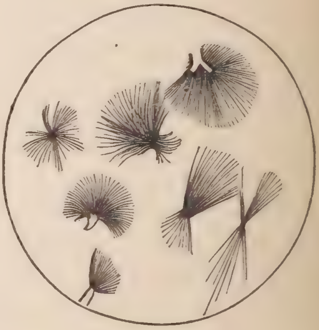
1. *Sulphate of Quinia.*—Small globules or rounded vesicles, which even after a day do not unite, and form neither groups nor crystals (Fig. 78). Schrage described stellate groups of thin needles or spikes, which were also observed by the authors when working after Schrage's direction, but only in that portion of the liquid which had not become milky, while the latter contained only the described globules or vesicles. The stellate groups (Fig. 79) were, by comparison, recognized as sulphate of quinia.

FIG. 78.



Quinia Sulphate with K Scy.

FIG. 79.

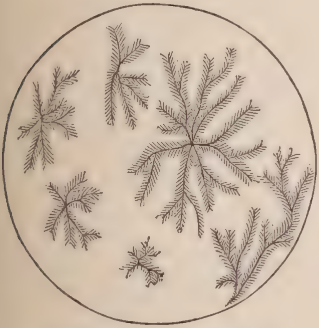


Quinia Sulphate.

The above minute globules were also obtained with valerianate and acetate of quinia, and in one case spike-like crystals appeared, which were due to an admixture of cinchonidia salt.

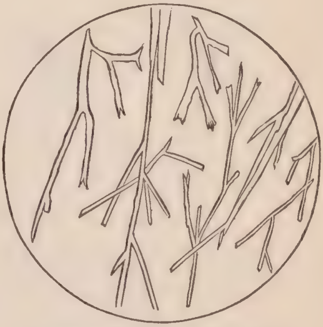
2. *Sulphate of Quinidia.*—Crystals are at once observed united into striking groups (Fig. 80). They are of a brownish-yellow color in transmitted light, and in general resemble Schrage's quinidia crystals.

FIG. 80.



Quinidia Sulphate with K Scy.

FIG. 81.



Cinchonia Sulphate with K Scy.

3. *Sulphate of Cinchonia.*—Long radiating crystals, mostly considerably branched (Fig. 81), and resembling antlers or equisetum. They agree with one of Schrage's pictures, and with the other only in the presence of cinchonidia.

4. *Sulphate of Cinchonidia.*—The crystals, which appear at once, form either dense tufts stellately arranged around a central point (Figs. 82 and 83), or uneven, thin, spike-like crystals,

FIG. 82.

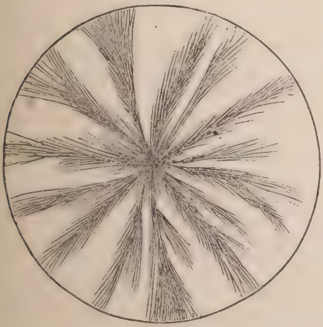
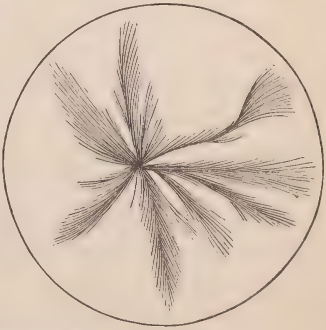


FIG. 83.



Cinchonidia Sulphate with K Scy.

which are united in star-like (Fig. 84) or fan-shaped (Fig. 85) groups.

By means of the microscopic examination described, the cinchona alkaloids may not only be distinguished from each other, but the difference in the crystalline form will likewise detect all impurities and adulterations, and this method is the more important as, for the latter purpose, the so-called wet way is much more tedious, though by no means superfluous. When purchasing a quinia salt the authors recommend to dissolve about 0.1 gram of it in 10 or 15 cc. of chlorine water, and add 2 or 3 drops of ammonia. If an emerald-green color is produced quinia or quinidia, or both, are present, but possibly also cinchonia or cinchonidia. The microscopic examination gives the best results. The authors made about twenty mixtures of sulphate of quinia with variable quantities of the other three alkaloids, the presence of which was in every instance revealed by the microscope. A. J. Ph., April, 1878, p. 178; from Arch. Ph., Dec. 1877, p. 515–521.

Fig. 84.

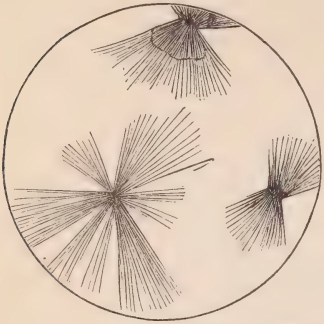
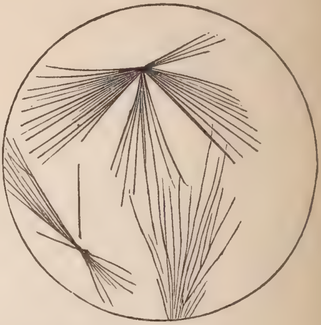


Fig. 85.



Cinchonidia Sulphate with K Scy.

Quinia.—Prof. Albert B. Prescott communicates some "Laboratory Notes" on quinia and some of its compounds, from which the following is extracted:

1. *Solubility of Quinia Precipitate in Water.*—W. J. Holloway has found that when quinia was precipitated from the solution of its acid sulphate by sodium or ammonium hydrate, and the precipitate was washed on a filter with water until the washings gave no cloudiness with barium salt, the loss of quinia amounted to 11.6 per cent. A. S. Lobb washed 0.280 gram of dried quinia on the filter, with half a liter of water, dropped from a burette,

at about 87° F., and found the alkaloid had lost 50 per cent. of its weight, each cc. having dissolved 0.000216 gram of quinia. In all these cases the filtrates gave a precipitate with potassium mercuric iodide. *The solubility of quinia precipitates in solution of sodium sulphate* was also determined by Mr. Lobb and found to be practically the same as in water. This is of interest, because this solution is the filtrate in the use of the best precipitant with the common salt of the alkaloid. It becomes evident from the above that the precipitation of quinia as a free alkaloid is inaccurate in quantitative work, and also, that the precipitation of the quinia by alkali, in the preparation of citrate of iron and quinia, is wasteful and inaccurate.

2. *Gravimetric Determination of Quinia as a Precipitate by Potassium Mercuric Iodide.*—J. J. Johnston and A. S. Lobb have found the value of this precipitate (washed and dried at 212° F.) to 2.900 grams for 1 gram of quinia dried at the same temperature. The precipitate of potassium mercuric iodide is very close and bears water-washing without appreciable loss. The reagent need not be of standard strength for gravimetric results. It can be prepared by simply treating solution of corrosive sublimate with solution of iodide of potassium until the precipitate at first formed is just all dissolved. The finding in the above was the means of three determinations, using Mayer's solution upon an acidulated sulphate solution of the alkaloid. The latter was Powers & Weightman's "pure quinia," which lost 6⅔ per cent. at 212° F. The *volumetric* results also agree well with those obtained by Mayer.

3. *Gravimetric Determination of Quinia as a Precipitate by Phosphomolybdate.*—Mr. Lobb has found that the precipitate is exceedingly close in the case of quinia, and if the reagent, acidulated solution of phosphomolybdate of sodium, is added in slight excess, it separates admirably. The precipitate bears washing without loss, but does not bear a temperature above 158° F. without reduction of molybdenum. Dried below that temperature, 3.665 grams of the precipitate correspond to 1 gram of quinia dried at 212° F.

4. *Solubility of Quinia Precipitate in Washed Ether.*—This was found by Mr. Lobb to be 20 parts of ether for 1 part of monohydrated quinia, which would be equal to nearly 21 parts of washed ether to 1 part of *anhydrous* alkaloid. The determination was

made by digesting quinia with the ether in a close vessel for 24 hours, then carefully and accurately weighing a portion of the solution, evaporating and drying the residue at 212° F., and weighing. The residue was calculated as monohydrate. It was amorphous and did not yield a perfectly crystallizable sulphate.

5. *Valuation of Commercial Citrate of Iron and Quinia.*—W. J. Holloway has determined the percentage of quinia in 6 samples of citrate of iron and quinia to be 5.2, 12.2, 8.7, 9.0, 11.4, and 8.3 per cent. respectively. The determinations were made as follows: A weighed portion of the preparation was dissolved in water. A small amount of tartaric acid was added to prevent the precipitation of ferric hydrate, then solution of sodium hydrate was added to alkaline reaction, and the liquid repeatedly shaken with successive portions of chloroform to exhaustion. The residue of evaporation of the chloroformic solution was redissolved in water by the aid of sulphuric acid and the solution treated with sodium hydrate and chloroform as before. The residue of *total alkaloid* obtained by the evaporation of the chloroformic solution, dried at 212° F., was accepted as quinia, containing, according to Allen (Ph. J. Trans., June 3d, 1876), 4.28 per cent. of water. In each of the 6 samples Mr. Holloway found sulphates present. In three of them the quantities of sulphuric acid were found to be less than 1 per cent. of the preparations. In the other three the quantities were found to be, respectively, 1.8, 3.5, and 6.5 per cent. The difficulty of washing the ferric hydrate completely free from sulphuric acid, as well as the waste occurring when the quinia precipitate is washed with too much water, accounts for the smaller percentage.

6. *Proportion of Quinia in the Citrate of Iron and Quinia of the U. S. P.*—The Pharmacopœia has no statement of the percentage of quinia in this preparation. By calculation from the materials, assuming that normal ferric citrate is formed, the preparation, if made strictly anhydrous, would contain 15 per cent. of absolute quinia, equivalent to 17.5 per cent. of the trihydrate of quinia, no waste quinia being considered. A sample of citrate of iron and quinia, made by Mr. Holloway, lost 12.5 per cent. of water on the steam-bath. Four other samples (commercial? Rep.) lost respectively, 9.2, 4.2, 8.1, and 6.8 per cent. Two samples of the preparations were made by Mr. Holloway, without precipitating the alkaloid from its sulphate, and with addition of ammonia, as de-

scribed further on, and were found to contain 14.9 and 14.5 per cent. of quinia respectively.

The preparation of the U. S. Ph. is not in use by reason of its difficult solubility. Hence nearly all the citrate of iron and quinia manufactured is made on a basis of some sort of citrate of iron and ammonium. Taking the officinal citrate of iron and ammonium, Mr. Holloway found it to be *too basic* to dissolve the quinia or its sulphate. He found that if in a fluid ounce of solution of citrate of iron, 48 grains of sulphate of iron were dissolved, and then 1½ fluid drachms of water of ammonia (half the proportion of the U. S. Ph. for citrate of iron and ammonium) were added, the addition of 2 grains of citric acid furnished a preparation which, when scalded, dissolved with slight turbidity in water, whilst with 3 grains of citric acid the scales dissolve perfectly. The turbidity in the first case is due to the separation of quinia. The author appears to favor the introduction of the sulphate of quinia direct into the preparation; but if the alkaloid is to be precipitated, he suggests that the sulphate be dissolved by the aid of citric acid instead of sulphuric, that a limited quantity of solutions be made, which should be precipitated by ammonia in excess and the precipitate drained without washing. A. J. Ph., Oct. 1877, pp. 481–487.

Quinia—Reaction with Ammoniacal Salts.—Cazeneuve and Caillol, in the course of their article on the preparation of cinchonia (which see), mention some singular results obtained by Prof. Glénard, of Lyons, in his investigations on the chemical behavior of quinia and cinchonia, which make it possible to distinguish these two alkaloids from each other under the microscope. Quinia, mixed with distilled water, presents under the microscope an amorphous character, if it has been prepared from one of its salts by precipitation with a base. Cinchonia, under the same circumstances, likewise appears amorphous. But on adding a drop of a solution of sulphate, oxalate, or phosphate of ammonium to the mixture, almost instantly the quinia is seen to change into crystalline needles of sulphate, oxalate, or phosphate of quinia, while cinchonia remains unaltered. Further details are expected. New Rem., Sept. 1877, p. 258; from Rép. de Ph., 1877.

Quinia—Colorimetric Method of Estimation.—Henry Trimble recommends an approximate method for estimating quinia, which is based upon the intensity of color produced when the alkaloid is treated with chlorine water and solution of ammonia. A standard solution is prepared (fresh for each examination? Rep.), by taking 1 centigram of quinia or one of its salts, dissolving it in about 5 cc. of fresh chlorine water, adding 10 cc. of solution of ammonia, and diluting this dark-green liquid in a glass cylinder to 100 cc. In estimating a 1-grain quinia pill, for example, a similar cylinder is taken into which is placed a fractional part of the solution obtained by treating the disintegrated pill with chlorine water and ammonia, and diluting with water until it exactly corresponds in color with the standard solution. Then by a little calculation the amount of quinia is known. By a little practice the results become surprisingly accurate. The presence of quinidia, of course, interferes with the results, but the author considers this of little moment, as it is not as liable to be fraudulently employed as the cheaper alkaloids. A. J. Ph., Nov. 1877, p. 536.

Quiniretin.—The action of sunlight upon quinia and cinchonia in saline solution has been pointed out by various authors, but it remains an open question to what extent the acids in combination with the alkaloids are concerned in the changes noted, and whether the alkaloids themselves are subject to such change. Prof. Flückiger has accordingly made some experiments with *quinia* in this direction, and he has found that when very dilute solutions in water—1 p. in 2000—are exposed to direct sunlight, a very rapid change occurs; the liquid very rapidly turns yellowish or brownish throughout, by and by becomes turbid, and after a few days a brownish matter sinks to the bottom, amounting when dry to nearly the quantity of quinia originally employed, a very little quinia remaining in solution apparently unchanged during the period mentioned. The author describes the new decomposition product, which for the sake of convenience he has named "quiniretin," as follows: It apparently has the same composition as quinia, but is neither quinia nor quinicia, nor does it contain a trace of either. It is devoid of alkaline reaction, and though dissolved by acids, it is unable to combine with them. It is insoluble in alcohol, in ether, or in cold or boiling water, softening but little in the latter. Hydrochloric acid of 1.11 sp. gr. dissolves it abundantly, forming an intensely brown solution, which may be diluted with water without becoming turbid. Its taste is bitter, like that of quinia, but also somewhat aromatic. Its hydrochloric solution is not precipitated by tannic acid, but is precipitated—though not redissolved—by ammonia; also by iodohydrargyrate of potassium, and the chlorides of ammonia and of sodium. Other reactions are given, all of which point to a distinct character for the new substance.

Experiments were also made with other alkaloids. Aqueous solution of *morphia* is very slightly altered; of *codeia* very much; of *strychnia* scarcely; that of *brucia* turns brown. Ph. J. Trans., May 11th, 1878, p. 885.

Ferrocyanhydrate of Quinia.—The Pharmaceutical Society of Paris has adopted the following formula: Four parts of sulphate of quinia and enough distilled water to form a not too thick mixture are mixed with a concentrated solution of one part of ferrocyanide of potassium, the whole is heated to boiling for a few seconds, and then allowed to cool. The mother liquor, from which more of the salt is obtained on concentration, is poured off from the resin-like mass, the latter washed with hot water and crystallized from boiling alcohol. It is in small yellowish needles, bitter, slightly soluble in water, freely in alcohol, and efflorescent in air. The same society gives formulas for

Bromhydrates of Quinia, both basic and neutral. The *basic* salt is obtained by heating 10 grams of sulphate of quinia with 80 grams of water to boiling, and adding 3.40 grams of dry bromide of barium, dissolved in 20 grams of water; the sulphate of barium is filtered off and the filtrate evaporated and crystallized. It forms silky needles, which require 60 parts of cold water for solution.

The *neutral* salt is made in a similar manner, except that the quinia salt is dissolved by the aid of just sufficient sulphuric acid, and 6.80 grams of bromide of barium, dissolved in 25 grams of water, are used for decomposition; the mixture is heated to boiling, filtered, the filtrate evaporated to 35 grams, and allowed to crystallize. It crystallizes in handsome prisms, which are soluble in 7 parts of cold water, and freely in alcohol and in hot water.

Tannate of Quinia, according to the same authority, is prepared by adding solution of gallotannic acid, free from resinous matter, to a neutral solution of quinia salt until the precipitate is redissolved; the solution is then neutralized exactly with solution of bicarbonate of sodium, whereby the tannate of quinia is precipitated ; this is collected on a filter, drained, dried, powdered, and washed with distilled water, and finally dried again. It is a white amorphous powder, 3.5 parts of which correspond to 1 part of sulphate of quinia; if prepared from the latter salt, it always retains a certain quantity of sulphuric acid. A. J. Ph., Sept. 1877, p. 442.

Tasteless Tannate of Quinia—Preparation.—According to A. Berwick, a tasteless tannate of quinia is obtained by mixing 20 parts of sulphate of quinia with 600 parts of distilled water, having a temperature of 60° to 70° C. (= 140° to 158° F.), and carefully adding dilute sulphuric acid, with the precaution to leave a few floccules of the quinia undissolved. To this is slowly added, and with continued stirring, a cold prepared solution of 60 parts of tannin in 600 parts of distilled water. The precipitate is collected upon a filter, washed with 100 parts of distilled water, and dried upon bibulous paper at the ordinary temperature. The yield is 70 parts. The filtrate contains a little tannin, but not a trace of quinia. The process is a modification of the one adopted by the German Pharmacopœia. A. J. Ph., May, 1878, p. 259, from Phar. Zeit., Nov. 10th, 1878.

Tannate of Quinia.—Julius Jobst has subjected various samples of tannate of quinia to analysis and has found that they not only vary in the percentage of alkaloid that they contain, but also in the quality of the total alkaloids found. After trying various methods for the determination of the alkaloid, he adopted the following as the best: 1 gram of tannate of quinia is powdered, stirred into freshly prepared milk of lime, and evaporated to dryness on the water-bath. The powder so obtained is extracted with chloroform, and the chloroformic solution evaporated in a tared beaker, dried at 120° C. (= 248° F.), and weighed. The contents of the beaker are then dissolved in a little water and a few drops of diluted sulphuric acid, filtered if necessary, and then shaken with 3–4 cc. ether and ammonia in excess. The two layers of liquid which form remain clear if only quinia is present; a greater or less turbidity is evidenced in the presence of the other alkaloids. Operating by this method for the isolation of the alkaloid, and by appropriate methods of identification when the alkaloid was composed of a mixture, the author obtained the following results:

1. Neutral tannate of quinia, prepared at the establishment of

Jobst: grayish-white lumps; bitter; obtained by precipitating a neutral solution of hydrochlorate of quinia with tannate of ammonium; contained 31.37 per cent. quinia and 7.2 per cent. water.

2. *Tannate of quinia*, prepared at the establishment of Jobst by the formula of the Ph. Germ.: light-yellow lumps; bitter; contained 22.72 per cent. quinia and 9.7 per cent. water.

3. *So-called tasteless tannate of quinia:* method of preparation unknown by the author; not bitter; brown-yellow powder; contained 4.46 per cent. quinia, 7.33 per cent. cinchonidia, 11.97 per cent. conchinia (quinidia), and 9.1 per cent. of water.

4. *Commercial tannate of quinia:* method of preparation not known; light yellow; bitter powder; contained 4.93 per cent. quinia, 13.10 per cent. cinchonidia, 2.43 per cent. conchinia, 3.35 per cent. cinchonia, and 9.8 per cent. water.

5. *Commercial tannate of quinia:* method of preparation not known; gray lumps; strongly bitter; contained 6.23 per cent. quinia, 20.80 per cent. cinchonidia, with traces of conchinia and cinchonia, and 10.2 per cent. water.

6. *Tannate of quinia:* prepared by the author with 4 p. of tannin and 1 p of sulphate of quinia in acidulated solution; yellowish-white powder; faintly bitter; contained 10 per cent. of quinia, and 10.7 per cent. of water.

7. *Tannate of quinia:* prepared by the author with 5 p. of tannin and 1 p. sulphate of quinia in acidulated solution; yellowish-white powder; scarcely bitter; contained 7.40 per cent. of quinia, and 11.4 per cent. of water.

The results of these analyses appear to prove, that tannic acid is capable of forming very variable compounds with quinia, according to the proportion or manner in which it is employed, and the author concludes, that to obtain a preparation of constant composition, definite quantities of tannic acid and quinia must always be used. The results also prove that commercial tannate of quinia, in Germany at least, is a very unreliable preparation. Arch. Ph., April, 1878, p. 331–335.

Citro-thymolate of Quinia.—C. Pavesi reports that he has obtained a compound, which he calls citro-thymolate of quinia, by treating quinia with thymol and a small quantity of citric acid. Four parts of quinia are placed in a flask with 6 parts of oil of thyme and a sufficient quantity of alcohol to effect complete solution. The mixture is heated in a water-bath for a few minutes, allowed to stand during 12 hours, and then 2 parts of citric acid in powder added. The whole is again heated, filtered, and the liquid evaporated to syrupy consistence. Upon cooling, a yellow matter is deposited in confused crystals. This substance is treated with boiling water and animal charcoal, filtered and evaporated at a low temperature. After 24 hours the salt is obtained well crystallized. The new compound is very white, moderately soluble in cold water, more soluble in boiling water, and very soluble in alcohol. It has a very bitter taste, recalling that of oil of thyme. The presence of the three constituents can be demonstrated by the use of suitable reagents, but the exact composition has not been determined by the author. Ph. J. Trans., Sept. 22d, 1877, p. 222; from J. de Pharm.

Citrate of Iron and Quinia.—Oscar Zinn procured six commercial samples of this salt, which were separately dissolved in acidulated water, precipitated by carbonate of sodium, the precipitate washed with water, and the dissolved quinia estimated in the filtrate by agitation with ether. Four samples yielded respectively 11.7, 14.4, 14.4, and 15.4 per cent. of this alkaloid, the nature of which was proven by its solubility in ether, and the green color resulting from the action of bromine water and ammonia. The other two samples contained 6 and 9 per cent. of cinchonia, but no quinia.

The same ground was gone over by Henry G. Drueding, who precipitated the solutions of the salt with ammonia, agitated the mixture repeatedly with ether, evaporated the ethereal solutions, and weighed the residue. The six samples were free from cinchonia, the precipitates being completely dissolved by ether. The samples yielded respectively 2, 8, 10, the remaining three 15 per cent. of alkaloid. A. J. Ph., Nov. 1877, p. 550.

Fraudulent Quinia.—Dr. Pratesi reports on a chemical product, said to be of German origin, and offered as adapted for the fraudulent substitution of quinia. It resembles sulphate of quinia in appearance and in the behavior to alcohol, ether, chloroform, and ammonia, but is freely soluble in water, not precipitated by chloride of barium, not persistently bitter, and when heated on platinum foil burns, giving off violet vapors. A. J. Ph., Feb. 1878, p. 70; from Pharm. Zeit., Dec. 1877, Germ. di Chimica.

Quinia—Substitutes.—Prof. Theo. Husemann, in the course of a long article, in which he discusses the relative value of those remedies which have at various times been proposed as substitutes for quinia, draws attention to an alkaloid, which alone can be regarded as a rival of quinia, standing in effectiveness between it and the other cinchona alkaloids, and which has fallen into undeserved oblivion. This alkaloid is:

Bebeeria (or Bibiria, according to Binz), obtained from bebeeru bark, which is also used as dyewood, and is derived from *Nectandra Rodiæi*, Schomburgh, a tree belonging to the natural order Lauraceæ, and a native of Guiana. From the investigations of Binz and Couzen, it appears that the physiological effect of bebeeria is identical with that of quinia. Both are equally effective in arresting and preventing putrefaction and fermentation, as well as in destroying the white blood-corpuscles. Flückiger, a few years ago, found that three hitherto dissociated alkaloids, namely, bebeeria, buxina, and pelosina, were probably identical. The antipyretic effects of *buxina* have, indeed, already been pointed out by various Italian physicians, chiefly Dr. Vitali, of Malegnano. *Pelosina* is an alkaloid contained in *Cissampelos Pareiræ*, and *Chondodendron tomentosum;* its therapeutic properties, however, are as yet undetermined. Supposing, then, that those three alkaloids are identical, it would be an easy matter to supply large quantities of the alkaloids, by preparing it from some species of Buxus, perhaps *B. sempervirens*, although the presence of various other, and some of them highly poisonous principles, would make its preparation, except on a large scale, somewhat troublesome. The author mentions, on the authority of Messrs. T. & H. Smith, of London and Edinburgh, that about 50 tons of bebeeru or greenheart bark are annually brought to the London market, and that a large demand would doubtless produce a more abundant supply. New Rem., October, 1877, p. 301; from Ph. Handelsbl.

Quinia—Bebeeria as Substitute.—In contradiction to the views expressed in the above, L. Hebenstreit denies absolutely that bebeeria has reliable febrifuge properties, and implies that its reputed virtues are mainly due to the puffings of transatlantic (American) and English physicians. He declares that he will await the verdict of "German" physicians. The abstracter of this paper, in "New Remedies" (Dec. 1877, p. 363), comments as follows:

"If the author were less self-conceited, we would undertake to show him that the opinions of transatlantic physicians are, as a rule, based on as sound common sense and are just as reliable as those of the continental ones, although we cannot deny that therapeutics are more systematically studied in Germany than elsewhere."

Quinia—Oriental Substitutes.—Prof. X. Landerer states, that although quinia is the only reliable remedy for the chronic fevers of the Orient, its high price forbids its use among the poorer classes, and therefore several substitutes are resorted to. Physicians use often with success an *extract of olive leaves* and *immature olives*, made with diluted sulphuric acid. A popular remedy with poor people is *Cayenne pepper*, in doses of one to two drachms, with rum or mastichonaki. A. J. Ph., April, 1878, p. 174.

Sulphate of Quinidia.—The statement having been made by M. Petit before the Paris Société de Pharmacie, that the neutral sulphate of quinidia does not contain water of crystallization, Dr. J. E. Vrij reviews his former experiments in this direction, and has made some additional experiments, which prove that the normal crystallized salt contains two molecules of water of crystallization; but it appears to part with this with great facility, and hence commercial sulphate, which has been kept for some time, may be practically free from water, as was the case with a sample of Howard's pure sulphate. This, a few years ago, contained 4.5 per cent. of water, and when recently examined only contained 0.35 per cent. To meet the wish expressed by a chemist in one of the Dutch journals, to become acquainted with some cheap reagent to test the purity of commercial sulphate of quinidia, the author has made some experiments in addition to previously published experiments, and recommends, as a result, the following test as perfectly reliable: Dissolve 1 p. of the salt in 50 p. of hot water, and add to this solution a half part of iodide of potassium. If the precipitate is not sandy, but resinous, no further trouble need to be taken, for this resinous aspect proves that the salt contains either cinchonidia or cinchonia, or perhaps both of them. If, however, the precipitate constitutes a heavy sandy crystalline powder, the filtered liquid is after some hours tested by liquor ammonia. If this addition makes the liquor only slightly turbid, *without formation of an appreciable precipitate*, the conclusion is that the salt is really good sulphate of quinidia, and contains only traces of other cinchona alkaloids, which generally is a slight trace of cinchonia. Ph. J. Trans., March 23d, 1878, p. 745.

Sulphates of Quinidia and Cinchonidia.—Bouchardat gives the following distinctions between the sulphates of quinidia and cinchonidia—two alkaloidal compounds which have, especially in commerce, frequently given rise to confusion:

Cinchonidia was discovered by Winkler in 1848; its sulphate has been long known and designated as "sulphate of quinidia" by A. Delondre (who, together with O. Henri, discovered the true alkaloid quinidia), by F. Boudet and Bouchardat, and by German manufacturers of cinchona alkaloids. Pasteur demonstrated its isomerism with cinchonia, and dispelled all uncertainty in regard to it. The rotatory power of cinchonidia has since been rigorously determined by Audemans, and by G. Bouchardat (fils), upon the pure alkaloids, both of whom obtained exactly the same results. Commercial sulphate of cinchonidia is often mixed with a small quantity of sulphate of quinidia, from which it has not been entirely separated in the course of manufacture.

Sulphate of Quinidia is a much scarcer article in trade than the cinchonidia salt. It was extracted by Delondre and O. Henri from the yellowish solution remaining after the separation of quinia and cinchonia from Calisaya bark, which latter has, however, long since ceased to be the only source of this alkaloid. Van Heijningen obtained it from the complex substance known as chinoidin, and gave it the name of β quinine. Winkler extracted cinchonidia from a bark, which he found to have great resemblance to Huamali bark, as well as from Maracaibo bark. The same base exists also, in considerable quantities, in the barks which are gathered to the north of Bogota, at Velez, Socorro, Pamplona, and Ocania. It is probable that these, or allied species, are identical with some of those now cultivated in Java and India.

According to De Vrij, the best source for the preparation of cinchonidia is the bark of *Cinchona succirubra*, cultivated in British India and in Java. This bark is very rich in alkaloids, containing 5 to 10 per cent.; and among these cinchonidia is predominant. New Granada bark is also very rich in cinchonidia.

The above referred-to confusion in regard to the commercial nomenclature of the salts of the two alkaloids is, however, confined exclusively to Europe; the sulphates of quinidia and cinchonidia of American manufacture being properly so called. N. Rem., Sept. 1877, p. 273.

Cinchonia—Direct Extraction from Bark.—Cazeneuve and

Caillol propose to obtain cinchonia, not as a by-product in the manufacture of quinia, but directly from gray Loxa bark, which is very rich in cinchonia, by mixing the powdered bark with its own weight of slaked lime, packing the mixture in a displacer and exhausting with commercial ether.* On evaporating off the latter a residue of a yellowish-white color is left. This is taken up by boiling alcohol and treated with a little animal charcoal, when it will, on evaporation, leave crystals of pure cinchonia. Cinchonia is ordinarily but little soluble in ether; but, under the above conditions, when extracted by lime from the vegetable tissue, it is dissolved by it. Alcohol or chloroform are inconvenient, as they dissolve too much of the coloring matter. N. Rem., Aug. 1877, p. 240; from Rép. de Ph., 1877.

Cinchonia.—H. Skraup has found that this alkaloid, when purified by repeated crystallization from alcohol, differs very materially in its ultimate composition from the formula $C_{20}H_{24}N_2O$, at present accepted. Numerous analyses of the alkaloid, its hydrochlorate, hydriodate, sulphate, and its platino-double salt, prove that the formula of Laurent $= C_{19}H_{22}N_2O$, is the correct one. The fractions of the commercial alkaloid which are more readily soluble in alcohol, proved to have greater resistance to the action of permanganate of potassium than those that crystallize first, and by fractional precipitation and crystallization of the tartrate the author succeeded in obtaining a base, the sulphate of which crystallized in thin prisms, the tartrate formed longer and finer needles than the corresponding cinchonia salt, and its composition corresponded to the formula $C_{15}H_{24}N_2O$. This base is in all probability identical with the *hydrocinchonin* of Caventou and Willm, and of Zorn.

The author's studies of the reaction of solution of permanganate of potassium upon commercial cinchonia appear to prove that the reaction takes place with evolution of but little gas, and that, besides the products of the reactions described by Caventou and Willm, formic acid is formed, without traces of fatty acids. Formic acid and *cinchotenin* are preponderatingly the chief products of the reaction, which appears, therefore, to take place according to the equation:

$$C_{19}H_{22}N_2O + O_4 = C_{18}H_{20}N_2O_2 + CH_2O_2.$$

Ph. Centr. H., Dec. 6th, 1877, p. 415.

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* The apparatus employed by the author was described in last year's "Report." See Proceedings, 1877, p. 49.

Cinchonia—Internal Exhibition.—Dr. Samuel Ashhurst recommends that the alkaloid be mixed with sugar of milk, and bicarbonate of sodium (1 p. alkaloid, 4 p. sugar of milk, and one-tenth p. bicarbonate of sodium) for internal exhibition. It may then be given with water or milk, or even dry, without producing the least sensation of bitterness, and being speedily dissolved by the gastric juice, is as effective as its saline compounds. There is an inherent difficulty in administering the powder pure, since, like many other insoluble powders, it has a tendency to be retained in the mouth by adhering to the teeth. The remains of the dose are gradually dissolved by the continual action of the salivary fluid, and the bitterness common to all the cinchona alkaloids is fully developed. By administering it as above recommended, this difficulty is completely overcome. If deemed necessary, the solution of the alkaloid in the stomach may be promoted by the administration of acidulous drink some time after the ingestion of the remedy. New Rem., June, 1878, p. 169.

Quinamia—Extraction from Red Bark.—According to De Vrij quinamia is best prepared from red bark (*cinchona succiruba*, cultivated in British Sikkim ? Rep.), as follows: One kilo of powdered bark is intimately mixed with milk of lime made of 250 grams of lime and 500 grams of water. The temperature of the mixture increases sensibly, owing to the oxidization of the cinchotannic acid by the air and its combination with lime. It is stirred up occasionally during the succeeding 24 hours, so as to promote the conversion of the cinchotannic acid into cinchona red. At the end of this time the mixture is dried on a water-bath, and afterwards treated with 10 kilos of 95 per cent. alcohol, which is raised to boiling for a few moments and then allowed to cool. It is now introduced into a long cylindrical percolator, and when the liquid has drained off the residuary mass is completely exhausted by alcohol. To the united alcoholic liquids enough sulphuric acid is added to render them decidedly acid. During the next 21 hours a quantity of sulphate of calcium, formed by the decomposition of the kinate and quinovate of calcium, is deposited. On the following day the solution is filtered and distilled until it has been reduced to 500 or 600 grams. It is then transferred to a capsule, the remainder of the alcohol evaporated off in a water-bath, and the whole is finally made up to weigh 2.000 grams by the addition of water. This is saturated at a boiling temperature with dilute soda solution, and as soon as it is faintly alkaline 40 grams of tartrate of sodium and potassium are added. This causes the formation of a very abundant, almost crystalline precipitate of the tartrate of quinia and cinchonidia, which are but little soluble in water. The precipitate is thrown on a filter and washed. The filtrate and washings are evaporated to 250 grams and treated with 500 cc. of ether in two separate portions. Cinchonia is thereby left behind. The ethereal liquid is distilled and the residue contains *quinamia*, amorphous alkaloid, and a little cinchonia dissolved by the ether. The mixture is treated, first in the cold, then by heat, with about 60 grams of diluted alcohol (equal parts of water and 95 per cent. alcohol), whereby all but the cinchonia is dissolved. The liquid, on cooling, deposits the quinamia in long needles, resembling sulphate of quinia. Should some of the amorphous alkaloid begin to be deposited at the same time, the further addition of a little alcohol will prevent and remedy this.

Quinamia is distinguished particularly by the following two reactions:

1. The chloroplatinate of quinamia is very soluble in water, so that very concentrated solutions of the alkaloid afford a precipitate with platinic chloride.

2. Chloride of gold precipitates quinamia, but the compound is rapidly decomposed or reduced, and the liquid assumes a purple red color. New Rem., Oct. 1877, p. 300; from L'Union Pharm., 1877, p. 204.

Quinetum, one of the names by which the collective alkaloids from Peruvian bark is called (see "Quinium," "Cinchona-febrifuge," in Proceedings, 1877, pp. 305 and 306), has been experimented with extensively by Dr. H. J. Vinkhuysen, physician to the household of the King of the Netherlands, and he has found it to be an extremely valuable remedy, equal to quinia in some, superior in other cases, and inferior only in cases of pernicious fever. It, moreover, does not cause noises in the ear, nor the other unpleasant symptoms attending the free use of quinia. New Rem., May, 1878, p. 144; from "The Practitioner," Feb. 1878.

Strychnia—Detection.—Alfred H. Allen read a paper on the subject of strychnia-detectives before the Society of Public Analysts, in which he recommends, as the result of a considerable experience, the following method: The matter to be tested is, first of all, digested on the water-bath with water and some acetic acid. Alcohol is next added in sufficient amount to facilitate the filtration of the liquid. The filtrate is evaporated nearly to dryness, water again added, and the solution filtered. The clear liquid is again evaporated to a syrup, strong alcohol added, and the liquid once more passed through a filter. The alcoholic solution is evaporated, the residue taken up with a small quantity of water, the solution filtered, if necessary, and treated with soda in moderate excess. The alkaline liquid is next shaken with ether, the ethereal layer removed with a pipette and allowed to fall—one drop at a time—into a porcelain basin heated with hot water. In this manner the strychnia is concentrated in a comparatively small space, instead of being spread out over a large surface. When the ether has all evaporated and the basin become cool, the residue is treated with sulphuric acid. The oxidizing agent, employed with the best result in the author's hands, is finely powdered dioxide of manganese. It should be added to the sulphuric acid in moderate amount, so as not to obscure the violet coloration (which occurs less rapidly than with ferricyanide of potassium), and the mixture should be well stirred. New Rem., Jan. 8th, 1878, p. 9; from "The Analyst."

Strychnia—Incompatibility with certain Saline Solutions.—A. B. Lyons had his attention drawn to this subject by a case of accidental poisoning. A lady had taken a medicine composed of bromide of potassium (2 oz.), strychnia (2 grs.), syrup of orange and water (each 4 oz.); nearly the entire contents of the bottle were taken without producing disagreeable effects, but the last dose produced all the symptoms of strychnia poisoning. In the opinion that a portion of strychnia had separated from the strong saline solution, and had thus been introduced in the last dose, the author made some experiments upon the effect of strong saline solutions on strychnia solutions, and he found that bromides, iodides, and chlorides had the effect of throwing the alkaloid (in neutral solutions as sulphate) out of solution. The author's present experiments are of a preliminary character. He promises to continue his investigations and to communicate the result. A. J. Ph., Oct. 1877, p. 504.

Brucia.—W. A. Shenstone, in the course of an extensive series of experiments, has invariably found brucia to contain some strychnia. In four samples (the examination of which is cited as example), obtained from sources of high character, the quantity of strychnia was 1 to 1.5 per cent., 0.43 to 0.46 per cent., 1.05 per cent., 0.25 per cent. The exact method by which these determinations are made, is as follows: About 0.5 gram of brucia is placed in a test-tube with 3 or 4 cc. of dilute acid (5 per cent. nitric acid), and warmed rather gradually by immersion in a beaker of hot water; effervescence occurs, and presently yellow crystals of cacotholina are deposited. Directly these make their appearance, solution of potassium hydrate is added in excess, and the mixture cooled by placing the test-tube in cold water; it is then extracted by agitation with chloroform, and the residue obtained by evaporating the chloroform is tested in the usual way. When the amount of strychnia is small, it is necessary to char the residue by the addition of sulphuric acid before testing it, as the chloroform usually extracts a small quantity of resinous substance which masks the reaction of strychnia. This interfering substance may, to a great extent, be removed by washing the chloroform with a small quantity of water, to which a drop of solution of ammonia has been added. The author also gives a method by which the brucia may be purified, which, though in principle alike, possesses several advantages over the method of fractional precipitation he had previously recommended (see Proceedings, 1877, p. 307). He now crystallizes the brucia by cooling a solution of it in boiling water to which a few drops of acetic acid have been added, and finds that one crystallization has considerable more effect in removing strychnia than a single precipitation, entails less loss, is less troublesome, and yields the alkaloid in a much better condition. It is, however, imperative to avoid prolonged heat to a solution containing brucia, in this or any other part of its manufacture or purification, since under these conditions he has observed the formation of a brown crystalline and a yellow deliquescent body at the expense of the brucia, which, as far as he has examined them, have the following properties:

The Brown Crystals.—Soluble in hot, less so in cold water, freely soluble in alcohol, insoluble in ether, contain nitrogen, reddened by nitric acid; an aqueous solution gives with ammonia a white precipitate, which is also reddened by nitric acid.

The Yellow Substance.—Chiefly soluble in water and spirit, not reddened by nitric acid, had an acid reaction (which may, however, be due to acetic acid set free during a certain stage of the process), is precipitated in crystals from solution in spirit by the addition of an equal volume of ether, slowly changes color on exposure. In some respects, but not in all, it resembles Ludwig's igasuric acid.

In connection with the above, the author mentions that the relative solubilities of brucia in hot and cold water are generally inaccurately stated; usually it is said to dissolve in 850 parts of cold, or 500 parts of hot water. This is very far from being correct. Hanbury, in "Pharmacographia," states that one part dissolves in 150 parts of boiling water, which, in the author's experience, is much nearer the truth; also, he has not attempted an exact verification. By boiling the brucia with distilled water, it rapidly becomes much more soluble, and a quantity that would readily crystallize before, ceases to crystallize on cooling; after boiling for 20 hours, a dirty-brown substance is yielded on evaporation, which the author has not yet examined. It is, however, reddened by nitric acid, apparently readily soluble in alcohol, and rather less so in water. Ph. J. Trans., Dec. 8th, 1877, p. 445.

Brucia—New Reaction.—Prof. Dragendorff draws attention to a new and delicate reaction for brucia. If brucia is dissolved in a mixture of *one* volume of pure sulphuric acid and *nine* volumes of water, a colorless solution is formed. On now adding a small quantity of dilute aqueous solution of bichromate of potassium by means of a glass rod, the mixture acquires a handsome raspberry-red color, and then changes to orange red and finally to orange brown. The color-reaction takes place more rapidly when warm than in the cold, and the author therefore recommends the experiment to be made at indoor temperature. The reaction is very handsome in solution, contains one part of brucia in 1000 parts, and is still quite evident in solution of 1-10000. It is, furthermore, recommended because the impure brucia, obtained in forensic determination, is readily obtained in colorless solution in the above mixture of sulphuric acid and water. Arch. Ph., March, 1878, p. 211.

Brucia—Production of Colored Crystalline Compounds.—David Lindo has observed that the *violet-colored compound*, produced by adding certain deoxidizing agents, such as protochloride of tin and sulphide of ammonium, to a heated mixture of brucia and nitric acid, may be obtained in the crystalline form, and that it appears to be the nitrate of a blue colored base, which is very unstable, absorbing oxygen from the air the moment it is liberated from its salt. The brucia is heated with a moderate quantity of concentrated colorless nitric acid, a little water is added, and the mixture boiled until the color changes to yellow; then a strong solution of sulphurous acid is added. On cooling, a mass of violet-colored crystals, in the form of minute needles, is deposited, which is washed on a filter, first slightly with water, then with alcohol, and dried in a water-bath. It is sparingly dissolved by cold, freely by hot water, forming a violet-colored solution. It is insoluble in alcohol. On exposure of its solutions to air, it is gradually changed to a yellow compound, from which the violet compound is again produced by deoxidizing agents. Oxidizing agents change the violet to the yellow compound at once. In strong alkalies it dissolves with a magnificent and intense blue color, which quickly changes to yellow, the two colors mixing and producing a beautiful green (intermediate ? Rep.). The

Yellow compound is also crystalline, and appears to be the nitrate of another base. It is easily obtained by acting on brucia with hot nitric acid, as above, allowing the mixture to cool a little, and adding a considerable volume of alcohol, when it separates in the form of minute crystals, which are washed and dried. Its solubilities correspond to those of the violet compound. Its solutions are bright amber yellow; deoxidizing agents change it to the violet compound. Ch. News, March 8th, 1878, p. 98.

Curaria.—Th. Sachs communicates a paper on curaria, in which he has shown that the so-called sulphate of curaria of Preyer is composed mainly of phosphate of calcium with traces of carbonate of calcium, and colored with an adhering brown mass. He contends that the method of preparing curaria by Preyer is worthless, since absolute alcohol only extracts traces of the substance from curare. Curare contains about 75 per cent. of substance soluble in water. The assertion of Preyer, that curaria gives a magnificent blue color with sulphuric acid is also incorrect. Curaria is colored red by that acid. It exists in curare as a sulphate, and not, as stated by Roulin and Boussingault, as acetate. Both the hydrochlorate and the sulphate of curaria are unstable compounds and neither of them is crystallizable. The formula for curaria given by Preyer is also incorrect. The formula derived from the analysis of the picrate of the alkaloid is $NC_{36}H_{35}$. The author has prepared the acetate of curaria, and has determined its reactions to be as follows: Sodium-platino-chloride, a voluminous faintly yellowish-white precipitate; potassio-mercuric iodide, a faintly straw-yellow precipitate; potassio-cadmium iodide, a whitish precipitate, partially soluble on heating; potassio-platinous cyanide, a flocculent, yellowish-gray precipitate, almost entirely redissolved by heat; potassio-platinous chloride, similar precipitate to the foregoing; chloride of gold, reddish-brown precipitate, apparently permanent in the liquid, but soon decomposed when collected on a filter and washed; tannin, a faint turbidity; picric acid, a copious and voluminous yellow precipitate; potassio-mercuric chloride, a voluminous white precipitate. Phosphate of sodium, arseniate of sodium, iodate of potassium, ferricyanide of potassium, and ferrocyanide of potassium, all produce whitish amorphous precipitates, with the exception of the ferricyanide, which forms a yellow precipitate. Ph. Centralh., No. 23, 1878, p. 211; from Ann. d. Chem.

Atropia and Daturia.—A. Pœhl has investigated the cause of the well-known and generally acknowledged difference in the medicinal activity of commercial atropia and its salts, which Hager has been inclined to attribute to another alkaloid, probably belladonnia. The supposed chemical identity of atropia and daturia, asserted by Planta, has led to the practice of preparing atropia not only from the root and leaves of belladonna, but likewise from the leaves and seeds of stramonium. Pœhl has recently again examined the two alkaloids prepared by himself and found the following differences:

Atropia is optically inactive, but daturia turns polarized light to the left, its specific rotating power being —14.12°. Atropia salts are precipitated by platinic chloride, but daturia salts are not affected by the same reagent. Atropia salts are not precipitated by picric acid, which, however, precipitates daturia salts. The two alkaloids are therefore chemically not identical, and the differences in the physiological action of commercial atropia is doubtless due to the absence or presence, in larger or smaller proportions, of daturia. A. J. Ph., April, 1878, p. 183; from Chem. Centralh., 1878.

Veratrum Alkaloids.—An interesting essay on the veratrum alkaloids has been published by Alexander Tobien, and is briefly abstracted in A. J. Ph., March, 1878 (pp. 122–126). The essay opens with a historical introduction citing the literature of the chemical investigation made with different species of veratrum. The poisonous properties of veratrum album were known in Spain in the sixteenth century, the rhizome being called *de balestera* or *de jerva*, and it is possible that the *charbak abgadh* of the Arabian physicians was the same drug. Since veratrum is not indigenous to Greece, the helleboros of the ancient Greeks was most likely not identical with the former. Pelletier and Caventou examined ver. album in 1819, and announced the presence of veratria. In 1837, Edward Simon corroborated the presence of veratria and found another alkaloid, which he called *barytin* (from its behavior to sulphuric acid), changing the name afterwards to *jervia*, and from his elementary analysis gave it the formula $C_{60}H_{45}N_2O_5$, which was changed by Limpricht ("Grundriss d. Org. Chem.," 1862) to $C_{60}H_{46}N_2O_6$. In 1842 A. Weigand confirmed the presence of veratria and jervia in veratrum album. The same results were arrived at by Herm. Weppen, in 1872, and in the same year Schroff, Jr., announced the presence of veratria in ver. lobelianum, while Dragendorff, in 1871, found the second alkaloid (beride jervia) to differ from veratria, and subsequently announced the presence of jervia also in ver. nigrum. The literature on the investigation of ver. viride, with which the American readers are familiar, is given in full in the author's essay. The present abstract is confined mainly to the author's investigations of the rhizomes of *V. lobelianum*, partly collected from wild plants in Austria, partly from cultivated ones in Russia, in both of which Dragendorff had already found notable quantities of veratroidia. The author's results confirm the presence of both veratroidia and jervia in these rhizomes. These alkaloids are also contained in the young leaves of V. lobelianum, while the dried rhizome of V. album yielded little jervia and more veratroidia. The cultivated old and recent rhizomes of V. lobelianum also contained jervia and veratroidia.

Veratroidia is rather freely soluble in water, freely in alcohol, ether, and chloroform, little in petroleum-ether (gasolin), somewhat more in benzin (benzol?) and amylic alcohol. It dissolves in water to the same extent as sabadillia; less than sabatrina, and more than veratria. It differs from sabadillia by its greater solubility in ether.

Jervia is very sparingly soluble in water and in solution of carbonate of sodium; freely in alcohol and in chloroform; less in amylic alcohol and benzin; very little in ether, and almost insoluble in petroleum. When pure it is dissolved by concentrated sulphuric acid with a yellow and finally light-green color. Concentrated muriatic and nitric acids cause no change in the color; but muriate of jervia, thrown into concentrated nitric acid, produces an evanescent rose color. Nitrate of potassium indicates jervia only when in dilution of 1 in 1200.

The author has observed that small quantities of veratroidia, also of veratria, will materially modify the reaction of jervia, and commercial jervia seems often to contain one or both of these alkaloids. Veratroidia is dissolved by cold concentrated muriatic acid with a pale rose-red color, which when heated is rapidly discolored. Veratria, on the contrary, dissolves in cold muriatic acid colorless, an intense and lasting red coloration being produced by heat, and this is likewise the case with sabatrina and sabadillia.

The elementary analysis of veratroidia points to the formula $C_{51}H_{78}N_2O_{16}$ or $C_{24}H_{37}NO_7$. Its action upon frogs is similar to veratria, but much more energetic than either sabadillia or sabatrina.

The composition of the veratrum alkaloids, as ascertained by Weigelin and Tobien, is the following:

Veratria, $C_{52}H_{86}N_2O_{15}$, *W.*
Veratroidia, $C_{57}H_{78}N_2O_{16}$.
Or, $C_{24}H_{37}NO_7$, *T.*

Sabatrina, $C_{51}H_{86}N_2O_{17}$, *W.*
Sabadillia, $C_{41}H_{66}N_2O_{13}$, *W.*
Jervia, $C_{27}H_{47}N_2O_3$. *T.*

Even if the molecular values of the formulas should, on further investigation, be altered, this is evidently a natural group of alkaloids, somewhat similar to those of opium and cinchona. The first four show a great similarity in their behavior to sulphuric acid; but with sugar and sulphuric acid, pure veratria yields a green, afterwards blue, coloration, while veratroidia gives a black-brown color, which lasts for some time. Veratria, sabatrina and sabadillia agree in their behavior to muriatic acid; but veratroidia and jervia differ very widely from it. In their action veratria, veratroidia, and perhaps jervia, are nearest related to each other; but the latter is distinctly characterized by its behavior to sulphuric, muriatic aud nitric acids. A. J. Ph., March, 1878, p. 122.

Veratrum Alkaloids.—C. R. Alder Wright and A. P. Luff, communicate their researches upon the alkaloids of *Veratrum Sabadilla* (Asagræa officinalis), in a paper read before the British

Chemical Society (June 5th, 1878). The authors discuss the results obtained by various chemists and pharmacists—notably Couerbe, who obtained an alkaloid which he termed *veratria*, which did not crystallize itself, but formed crystalline salts along with other bodies; Merck, who isolated a crystalline alkaloid, which he also termed *veratria*, although manifestly different from Couerbe's product; and more recently the results of Weigelin, and Schmidt, and Köppen. On examining the methods of extraction employed by these workers, it becomes evident that if the alkaloid is a saponifiable one it must have been decomposed more or less during the processes of extraction employed by them. The authors have discovered that Veratrum Sabadilla contains at least two saponifiable alkaloids, so that the discrepancies in the results obtained by former experimenters are accounted for to a great extent by the fact that the processes employed by them (almost invariably involving heating in contact with acids or alkalies, or both successively) must of necessity have yielded substances containing, besides the original base, the products of their alteration or decomposition.

The authors experimented on the *veratria* of commerce and the alkaloids extracted by themselves from sabadilla seeds. The commercial *veratria* was proved to be a mixture of alkaloids by saponifying some of it (by heating it with an alcoholic solution of soda for some hours), and getting two different acids from the products of the saponification; evidently at least two different alkaloids must have been present in order to have yielded two different acids on saponification; this is extremely probable also from the work of former experimenters, for, from the analytical data and general collateral evidences it is clear that the alkaloid termed by Merck *veratria*, agrees with that so termed by Couerbe.

The authors find that *sabadilla seeds* and commercial *veratria* contain three alkaloids, which they propose to distinguish by the names, *veratria*, *cevadia*, and *cevadillia.*

Veratria.—This is the *veratria* of Couerbe; it is non-crystalline, but furnishes some crystalline salts. Its formula is $C_{37}H_{53}NO_{11}$. Under the influence of saponifying agents, and the assimilation of a mol. of water, it is split into *dimethyl-protocatechuic acid* ($C_9H_{10}O_4$), and a new alkaloid, *verina* ($C_{28}H_{45}NO_8$). The *dimethyl-protocatechuic acid* is proved to be identical with *veratric acid*, hence the authors retain the name of *veratria* for the alkaloid which furnishes it.

Cevadia.—This is the *veratria* of Merck; it is crystallizable, an alcoholic solution of it furnishing anhydrous crystals; its formula is $C_{32}H_{49}NO_9$; under the influence of saponifying agents it splits up, with the assimilation of a molecule of water, into *methyl-crotonic acid* ($C_5H_8O_2$), and a new base, *cevina* $C_{27}H_{43}NO_8$. The *methyl-crotonic acid* is proved to be identical with *cevadic acid*, hence the authors have named the alkaloid furnishing it *cevadia*. This is identical also with the alkaloid of Schmidt and Köppen.

Cevadillia.—This alkaloid is non-crystalline; from its insolubility in ether, it somewhat resembles the *sabadilla* of Weigelin and Dragendorff, which the authors, however, have been unable to find either in the *veratria* of commerce or in *sabadilla seeds*, and the existence of which they doubt. The formula of *cevadillia* is $C_{34}H_{52}NO_8$; under the influence of saponifying agents it yields *cevadic acid.*

20 lbs. of sabadilla seeds yielded 60 to 70 grams of rough alkaloid, from which the author separated 8 to 9 grams of pure crystallized *cevadia*, 5 to 6 grams of *veratria*, and 2 to 3 grams of rough *cevadillia*, the remainder being mainly a mixture of cevadia and veratria. From their researches the authors conclude that the *veratria alkaloids* are closely allied in constitution to the *aconite alkaloids*, both as regards mode of decomposition when saponified, and as regards their nitrogenous radicals. Chem. and Drug., June, 1878, p. 255.

Aconite Alkaloids.—The results described in the first report of C. R. Alder Wright (see Proceedings, 1876, p. 355) to the British Pharm. Conference, on the chemical composition of the alkaloids extracted by Mr. Groves from *Aconitum ferox* and *A. napellus*, whilst rendering it probable that the principal active constituents of the two roots are not identical, were yet not completely satisfactory on the point, inasmuch as the methods of extraction adopted by Mr. Groves were in each case not at all unlikely to induce changes and decomposition of the alkaloids originally present; and that such changes were actually produced in the product from A. napellus is rendered highly probable by the circumstances that the majority of the mixture of the bases yielding crystallizable salts obtained by him consisted of an almost inert bitter base closely akin to the "crystallizable aconitia" of Duquesnel, but differing therefrom not only in physiological potency but also in facility of crystallization from ether; whilst by a different method of proceeding, Duquesnel obtained a considerable yield of a highly active, well-crystallized body (Compt. Rend., lxxiii, p. 207). A thorough revision of all that had been done on the subject seems therefore necessary, and was undertaken by Mr. Wright, who has arrived at the following practical conclusions, drawn from his experiments (which are as yet incomplete):

1. When *A. napellus* is treated by Duquesnel's process, there are extracted (*a*) a crystallizable alkaloid, insoluble in potassium carbonate solution, which is difficult to purify by simple crystallization from ether, but which after conversion into a crystalline salt and regeneration therefrom, gives numbers agreeing with the formula $C_{33}H_{43}NO_{12}$, and (*b*) a second alkaloid or mixture of bases, which does not crystallize itself, and does not yield crystalline salts, and which has a lower molecular weight than aconitia, and contains more carbon and hydrogen; (*c*) a non-crystalline base, or mixture of bases, soluble in dilute potassium carbonate solution, and possibly identical with (*b*).

2. The formula assigned to "crystallizable aconitia," viz., $C_{27}H_{40}NO_{10}$, by Duquesnel, who first isolated the substance in a state of moderate purity, does not exactly represent the composition of the pure base; the difference in Duquesnel's results being apparently due to imperfect purity of the substance isolated and examined by him.

3. The amorphous substance examined by Von Planta, to which he assigned the formula $C_{30}H_{47}NO_7$, was probably a mixture of aconitia, more or less altered during the extractive process, and the amorphous bases above mentioned. Whether this amorphous body pre-exists in the fresh roots, or whether it is formed in drying or during the extraction process, it is at present impossible to say. Probably "napelline" is identical with or closely allied to this body.

4. Although when alcoholic hydrochloric acid is used to extract the alkaloids from *A. napellus*, a considerable quantity of a comparatively inert base (base *A*, of First Report; see Proceedings, 1876) appears to be formed, and largely dilates the crystalline nitrate of the active base, $C_{33}H_{43}NO_{12}$, yet no appreciable amount of this substance appears to be produced by Duquesnel's tartaric acid method.

5. The method that ought to be adopted for the preparation of a pharmaceutical product of constant composition and properties is: (1) percolation by alcoholic tartaric acid, and evaporation to a small bulk of the percolate at as low a temperature as possible

(probably in a vacuum pan would be best); crystallization from ether of the base separated by sodium or potassium carbonate from the aqueous solutions of the extract (after separation of resin, etc.); in this way "base *A*," if present, would be separated; and (3) further purification by conversion into a crystalline salt, for which purpose the hydrobromide is well fitted; in this way small quantities of another base, which obstinately adheres to aconitia when crystallized from ether, are separated. The base obtained in this way is a simple body, expressed by the formula $C_{33}H_{43}NO_{12}$, in a state of great purity and possessing high physiological activity. Yearbook of Ph., 1876, p. 531.

A third report on the chemistry of the aconite alkaloids has been presented to the Br. Pharm. Conference (Yearbook of Ph., 1877, p. 444–468) by Mr. Wright and A. P. Luff. From the experiments described, together with those detailed in the previous reports, and the results obtained previously by Grover, Duquesnel, Hübschmann, and others, the authors draw the following conclusions:

1. *A. napellus* roots as met with in commerce contain a highly active crystallizable alkaloid, furnishing readily crystallizable salts. This is distinguished as *aconitia*, and is represented by the formula $C_{33}H_{43}NO_{12}$. In addition they contain more or less of another active alkaloid, crystallizable, but not readily yielding crystallizable salts. This is distinguished as *pseudoaconitia*, and is represented by the formula $C_{36}H_{49}NO_{11}$. Moreover, they contain (or at least the extract of the root does) more or less of the decomposition products, produced by the saponification of these bases in accordance with the reactions:

Aconitia. *Beryoic Acid.* *Aconia.*

$$C_{33}H_{43}N_{12}O + H_2O = C_7H_6O_2 + C_{26}H_{39}NO_{11},$$

Dimethyl-proto-
Pseudoaconitia. *catechuic acid.* *Pseudoaconia.*

$$C_{36}H_{49}NO_{11} + H_2O = C_9A_{10}O_4 + C_{27}H_{41}NO_8,$$

And further, an alkaloid apparently non-crystalline, and yielding non-crystalline salts, and containing a higher carbon percentage than any of these other bases, is also present. This seems to be of little physiological potency. One batch of roots worked up by Mr. Groves contained besides aconitia an entirely different base, not crystallizing itself, but giving well-crystallized salts. This base is comparatively inactive, and its salts are bitter and produce no lip-tingling, whence the name *picraconitia* is assigned to this base, its formula being $C_{31}H_{45}NO_{10}$.

2. *A. ferox* roots contain comparatively large quantities of *pseudoaconitia* with a little *aconitia*, and an alkaloid apparently non-crystalline and yielding non-crystalline salts, and containing a higher carbon percentage than any of the other bases. Apparently this is not identical with the analogous body from *Aconitum napellus.* The substance from which Von Planta deduced the formula $C_{30}H_{47}NO_7$ probably mainly consisted of this base.

3. *A. lycoctonum* roots appear to contain both *aconitia* and *pseudoaconitia*, the substances thence extracted by Hübschmann, and termed by him "*acolyctia*" and "*lycoctonia*," being apparently simple alteration and decomposition products of aconitia and pseudoaconitia in a more or less pure state.

4. So-called "aconitia" of commerce is a mixture of true aconitia and pseudoaconitia, with variable quantities of their alteration products, aconia and pseudoaconia, and of the amorphous unnamed alkaloids above alluded to. The "*napellia*" found by Hübschmann in commercial "aconitia" having been found by that chemist to be identical with his "acolyctia," is doubtless simply one of these decomposition products, viz., aconia, in a more or less pure condition.

5. The processes in ordinary use for the isolation of commercial "aconitia," are such as must inevitably bring about a large loss of active alkaloids through the saponifying actions above alluded to. The products of these actions are apparently far less physiologically active than the parent bases. In order to diminish this loss, the process of M. Duquesnel (use of tartaric acid) is far preferable to the ordinary methods (employment of hydrochloric or sulphuric acid). The crude alkaloids can be readily purified by crystallization from ether and petroleum spirit. True aconitia, $C_{33}H_{43}NO_{12}$, should further be converted into a crystallized salt if perfect purity is required. Unless crystallization of the alkaloids be employed, the products obtained will contain (besides other impurities) more or less of the unnamed amorphous alkaloids of higher carbon percentage.

6. A method of assay applicable both to *A. napellus* and *A. ferox* alkaloids has been arrived at, by which the amount of each physiologically active alkaloid present can be obtained with sufficient accuracy for practical purposes. It is probable that if man-

ufacturers would supply an article at a constant strength (say 30 per cent., 50, 70, or the like), as determined by this process, complaints as to irregularity in the efficacy of commercial "aconitia" would cease, whilst so doing would in many cases render it unnecessary to purify by crystallization the crude alkaloid.

7. From the ease with which both aconitia and pseudoaconitia decompose by saponification, it seems extremely probable that *liquid* preparations, such as tinctures, will gradually lose activity on keeping. This must inevitably occur where the liquids are neutral or alkaline, and will probably occur to some extent when the alkaloids are kept in solution, as salts of organic acids, for lengthened periods.

8. Aconitia and pseudoaconitia, although allied in physiological action and to some extent in chemical characters, do not seem, as far as experiments have as yet gone, to have a common nucleus or radical. They are allied, as regards their principal decompositions, to the opium alkaloids, narcotia, oxynarcotia, and narceia, which again are akin to the products obtained from the alkaloids morphia and codeia by treating them with the anhydrides of organic acids. From experiments now in progress, they appear also to be allied to veratria, whilst the results of Krant and of Lossen indicate a certain amount of analogy between aconitia, atropia, and cocaina, benzoic acid having been obtained by these chemists by the splitting up of the latter two bases.

Alkaloid from Japanese Aconite.—B. H. Paul and C. T. Kingzett have made some preliminary investigation upon aconitia roots imported direct from Japan and known to be genuine, whereby, by the process of Duquesnel, they obtained 0.18 per cent. of crude mixed alkaloids. By suitable treatment the authors obtained from the latter a crystallizable alkaloid, having the formula $C_{29}H_{43}NO_9$, which does not give crystallizable salts. They also obtained a further substance, which behaves as a salt of the crystalline alkaloid, but is itself uncrystallizable; from which it appears that a certain part at least of the alkaloid is in combination (as extracted by Duquesnel's process) with an acid, perhaps aconitia. Ibid., pp. 469–475.

Hypophosphite of Berberina—Preparation.—J. U. Lloyd recommends the preparation of this compound as follows: Dissolve 1 part of sulphate of berberina in 24 parts of distilled water at a temperature of 180° F.; add ½ part of litharge, and digest at the above temperature until a filtered portion will not produce a precipitate with solution of acetate of lead (or hot solution of chloride of barium), this requiring from 6 to 12 hours. Filter out the lead compounds, pass H_2S through the filtrate to separate remaining traces of lead, again filter, evaporate the solution to 8 fluid ounces, add solution of hypophosphorous acid until in slight excess, and allow the mixture to cool. Separate the magma of fine crystals with a paper or muslin filter, and dry.

Hypophosphite of berberina is a beautiful yellow salt, much more soluble than the muriate. By substituting other acids for the hypophosphorous almost any salt of berberina can easily be found. A. J. Ph., July, 1877, p. 339.

Caffeia—Extraction from Guarana.—Francis V. Greene has found the following method to give accurate results: The powdered guarana is intimately mixed with three times its weight of finely divided litharge, and the mixture is boiled in distilled water, the ebullition being continued until, on allowing the temperature to fall below the boiling-point, the insoluble portion is found to subside rapidly, leaving the supernatant liquid clear, bright, and without color. The quantity of distilled water required will be found to be about a pint for every fifteen (?) guarana used in the experiment, and that lost by the several hours' boiling necessary, must be made up from time to time. The mixture is now thrown on a filter, the precipitate on the filter is washed with boiling water as long as the washings produce yellowish precipitates with solution of phosphomolybdic acid, auric or platinic chloride, and a current of H_2S is then passed through the filtrate and washings to remove the small quantity of lead that has been dissolved. The sulphide of lead being filtered off, the solution is evaporated, after a time again filtered to remove a trace of sulphur, and finally evaporated to the crystallizing-point. The first crop of crystals is perfectly white; the mother liquor yielded a second crop of pure crystals by diluting with distilled water, filtering, evaporating, allowing to crystallize, and pressing the crystals between folds of bibulous paper. Finally the crystals are dissolved in boiling diluted alcohol, the solution is filtered, and set aside to crystallize spontaneously. The resulting crystals are perfectly pure and colorless, and the yield, in the author's opinion, represents accurately the caffeia in the sample. Compared with the method proposed by Stenhouse (A. J. Ph., 1857, p. 68), the author's process gives equally good results and is, moreover, much more expeditious. The application of litharge to the extraction of caffeia from tea and coffee was recommended by Prof. E. S. Wayne in 1875. A. J. Ph., July, 1877, p. 337.

Caffeia — Dose. — According to Nothnagel's "Arzneimittellehre," citrate and lactate of caffeia are usually given in Germany in doses of 0.05 to 0.1 gram, but French physicians commence with doses of 0.5 and increase to 2.0 and even 4.0 grams. Dr. Kelp repeatedly gave doses of 0.12 gram four times daily without apparent injurious effects, and Dr. Wolff states the dose in migraine to be 0.2 to 0.4 gram several times a day. A. J. Ph., June, 1878, p. 297; from Pharm. Zeit., April, 1878.

Emetia—Preparation.—J. Lefort and F. Wurtz have recently made certain experiments, with a view of determining the correctness of the composition of emetia determined by Lefort in 1869, but contradicted by the experiments of Glénard made last year. During the course of these experiments they employed an improved method for the isolation of emetia, which is based upon the insolubility of its nitrate in water. Extract of ipecacuanha is dissolved in a small quantity of water and the solution treated with a very concentrated solution of nitrate of potassium or sodium, when a pitch-like mass is deposited, which is composed of nitrate of emetia. This is dissolved in alcohol, the solution poured into milk of lime, the mixture evaporated to dryness on a water-bath, the dry mass powdered, the powder digested with ether, and the ethereal solution evaporated. The yellow residue (impure emetia) is treated with sulphuric acid (dilute? Rep.), the solution precipitated by ammonia, the white precipitate washed with distilled water, dissolved in alcohol, and allowed to evaporate slowly, when the alkaloid is obtained in hard, needle-shaped crystals, arranged in concentric groups. Elementary analysis gave figures corresponding to the formula $C_{28}NH_{20}O_5$. Glénard had found $C_{30}NH_{22}O_4$. It forms neutral salts with acids, and not basic salts as determined by the analyses of Dumas and Pelletier. In this respect the author's views coincide with those advanced by Glénard. Ph. Centralh., Nov. 8, 1877, p. 375.

Emetia—New Reaction.—Fred. B. Power finds that chlorinated lime, which by Wellcome and others has been found to produce a reddish coloration with certain alkaloids, produces with emetia a bright orange or lemon yellow coloration, which is apparently characteristic of this body, and is conveniently employed for its detection. A few drops of a solution of one part of emetia in 1000 parts of water, when evaporated to dryness and brought in contact with the test solution, readily produces the coloration; and with a solution containing one part of the alkaloid in 5000 parts of water the yellow coloration is still perceptible. The reaction is very much favored by the addition of one drop of acetic or other weak acid, to insure the liberation of the hypochlorous acid, upon which the reaction apparently depends, as chlorine is incapable of producing the coloration. The latter is permanent and may be retained quite indefinitely. The reaction may be employed as a means of testing the value of various species of ipecacuanha. If 1 gram of the root of Cephaelis ipecacuanha in fine powder be treated according to the process described by Prof. Flückiger ("Pharmacographia," page 335), for the isolation of emetia, *i. e.*, mixed with a small amount of quicklime and a few drops of water, the mixture allowed to dry upon the water-bath, subsequently exhausted by chloroform, and the filtrate allowed to evaporate on a capsule containing a few drops of dilute acetic acid, the nearly colorless residue obtained affords the characteristic coloration with a few drops of the solution of chlorinated lime. The root of *Richardsonia scabra*, Lin., or undulated ipecacuanha, which is occasionally quoted as a source of emetia, when similarly treated, does not produce this reaction. A. J. Ph., Aug. 1877, p. 391.

Salts of Pilocarpia.—A. W. Gerrard has succeeded in obtaining some almost pure and colorless pilocarpia (its purification having been hitherto a matter of difficulty), by means of the property which he found the nitrate to possess of being soluble in boiling alcohol, from which it separates on cooling in tufts of white shining crystals. By three crystallizations it can be obtained in an almost perfect state of purity. The crystals thus obtained are dissolved in water and the solution, made alkaline with potassic hydrate, is shaken with chloroform. The chloroform, separated and removed by distillation, yields as a residue the purified pilocarpia. Portions of the alkaloid prepared by this method were dissolved in water and neutralized respectively with nitric, hydrochloric, sulphuric, acetic, phosphoric, and hydrobromic acids, and the solution allowed to evaporate spontaneously. In three days they had all become crystalline, the nitrate, phosphate, and hydrobromate being best defined, while the remaining salts were very deliquescent. The *nitrate* is sparingly soluble in water, sparingly soluble in cold alcohol, but freely in that liquid at the boiling temperature. It is insoluble in ether, chloroform, benzol, and bisulphide of carbon. The *hydrochlorate* is soluble in water, alcohol, and chloroform; insoluble in ether, benzol, and bisulphide of carbon. The *phosphate* is soluble in water, sparingly soluble in cold, but more freely soluble in boiling alcohol, from which it crystallizes on cooling in lustrous tables. It is insoluble in ether, chloroform, benzol, and bisulphide of carbon. The *acetate* is soluble in all the solvents mentioned, except bisulphide of carbon. The *hydrobromide* is insoluble in bisulphide of carbon and ether; soluble in water, alcohol and chloroform. The crystals of the *sulphate* being imbedded in a viscous mass and difficult to separate, their solubility was not ascertained. The forms of crystals of all of these salts appear to belong to the tabular and oblique system. The stability and definite character of the nitrate and phosphate recommend them most for general purposes. The composition of pilocarpia appears to be as given previously by Mr. Kingzett – $C_{23}H_{34}N_4O_4\,(4H_2O)\,(O = 16)$. The Yearbook of Ph., 1876, p. 529.

C. T. Kingzett has again examined some salts of pilocarpia—the nitrate and chloro-platinate—which were furnished him by Prof. Attfield. The nitrate was not quite pure. When purified by conversion into chloro-platinate, recrystallization of the latter, etc., it gave on analysis figures which corresponded very closely with those previously obtained by him ($C_{23}H_{34}N_4O_4$) for the alkaloid, but the compound contained a slight excess of platinic chloride. Experiments made with the platinum salt confirm the previous observation, that pilocarpia yields trimethylamin when subjected to distillation with caustic soda. Yearbook of Ph., 1877, p. 615.

Nitrate of Pilocarpia.—This salt is obtained in white lamellate crystals by displacing jaborandi leaves with 80 per cent. alcohol, containing, per liter, 8 grams of muriatic acid. The tincture is distilled, the extract dissolved in water, filtered, rendered alkaline by ammonia, and repeatedly agitated with chloroform. The solvent is distilled off, the alkaloid exactly neutralized with nitric acid, the liquid filtered, evaporated and crystallized. The crystals are washed in a cylindrical percolator with cold absolute alcohol to remove coloring matter, and recrystallized from boiling alcohol in presence of some granular animal charcoal. The filtrate yields beautiful white crystals (about 5 grams from 1000 grams of the leaves), which are soluble in 8 parts of water at 15° C. (= 59° F.), in 7 parts of boiling absolute alcohol, and but sparingly soluble in the latter liquid when cold. A. J. Ph., Dec. 1877, p. 599; from Rép. de Phar., Aug. 1877.

Hydrochlorate of pilocarpia has been employed by Dr. Laubzer, who considers it a very valuable sialagogue and diaphoretic, the latter property being apparently somewhat inferior to that of jaborandi, over which it has the advantage of not producing nausea or emesis, nor of its administration being followed by headache or vertigo. A. J. Ph., Aug. 1877, p. 401; from Pharm. Zeit., No. 25.

Ergotinia.—Tanret communicates some further characteristics of this alkaloid, previously described by him (see Proceedings, 1876, p. 365, and 1877, p. 119), and gives an improved method of its preparation. The finely powdered ergot is extracted with 95 per cent. alcohol, the alcoholic tincture is rendered strongly alkaline with caustic soda, and the alcohol is distilled off on a water-bath. The residue is shaken with a large quantity of ether, and the ethereal solution with water to remove the soap dissolved in it. The ethereal layer now contains the alkaloid, and is shaken with an aqueous solution of citric acid, which removes it. The aqueous solution of citrate of ergotinia is shaken several times with fresh portions of ether, then rendered alkaline with carbonate of potassium in excess, and the liberated alkaloid again taken up by ether. The ether solution of ergotinia is decolorized by purified animal charcoal, distilled until it begins to be turbid, and then transferred to a glass cylinder, which is well closed and placed in a dark and cool place, where, after a day or so, crystals of ergotinia will form. The mother liquor will yield an additional crop of crystals, and finally leaves a yellow spongy residue. From 1 kilo of ergot of the recent harvest (1877) the author obtained 1.20 gram alkaloid, of which ⅓ was crystallized. Old ergot yielded ⅓–⅕ less. The alkaloid is thus obtained, both crystalline and amorphous, the latter being produced by the agency of both heat and light; and this change occurs even in the dry alkaloid, although much slower.

The relation of the two forms to reagents, the saturating power, the intensity of fluorescence of their solutions, remains unchangeably the same; but they are distinguished by their solubility, the amorphous modification being much more soluble than the crystalline. Subjected to elementary analysis by Villiers, in the laboratory of Berthelot, the crystallized ergotinia gave numbers corresponding to the formula $C_{70}H_{40}N_4O_{12}$ ($O = 8$). The hydrobromate and the hydrochlorate of ergotinia are amorphous. The sulphate was obtained in crystals, but great care was necessary to obtain it in that condition. Ph. Centralh., No. 22, 1878, p. 201; from Rép. de Ph., 1878.

Ditaïna (*Ditamina*).—Prof. Th. Husemann draws attention to the fact that the discovery of the alkaloidal principle in the bark of *Alstonia scholaris*—the so-called dita-bark—should be credited to A. Scharlée, an apothecary of Weltevreden, near Batavia. He had obtained, in 1862, from a bark obtained in the eastern part of Java, an alkaloid which he named *Alstonina*, in the belief that the bark was obtained from an Alstonia. This bark is now known to be dita-bark. The description of the alkaloid and its reactions correspond very closely with that given by Jobst and Hesse (see Proceedings, 1876, p. 366), as characteristic for ditamina. The latter name should, however, be retained for the alkaloid, since, in the meantime, a totally different bitter principle, from the Australian *Alstonia constricta*, has been so named. Gruppe, of Manilla, is generally named as the discoverer of the active principle of dita-bark (see Proceedings, 1874, p. 273); but the principle described by him has been placed in controversy by the experiments of Jobst and Hesse, above referred to, and his experiments having been made in 1872, the discovery is antedated by that of Scharlée. The process by which the latter obtained the alkaloid is given, but that pursued by Jobst and Hesse is to be preferred. Arch. Ph., May, 1878, p. 438.

Lobelina.—William H. D. Lewis, after reviewing the methods of Procter, Bastick, and Richardson for isolating the alkaloid of Lobelia inflata, gives the following method as yielding a much purer product than either of them: The powdered drug is mixed with purified animal charcoal, and, after moistering with water to which a small quantity of acetic acid has previously been added, it is packed in a percolator and macerated several days. More of the menstruum is then poured on and the percolation continued as long as the percolate possesses any bitterness. The solution is then gently evaporated to the consistence of an extract, triturated with an excess of calcined magnesia, and the filtered liquid (? Rep.) agitated with amylic alcohol, which is decanted and allowed to evaporate spontaneously. The lobelina may be further purified by dissolving in water, and filtering through animal charcoal, which retains the alkaloid, and from which it is removed by ether or by amylic alcohol. Sulphuric acid may be used in the place of acetic acid; but as acetic acid forms a more soluble salt (in water) than any other, it is to be preferred.

Lobelina, so obtained, has a light-yellow color and the consistence of honey. It has a strong alkaline reaction, forms crystallizable salts with acids (not acetic), but is itself uncrystallizable. It is readily decomposed by caustic alkalies; its odor is somewhat aromatic; its taste sharp and acrid. It is lighter than water, in which it dissolves with a yellow color, and is also soluble in alcohol, chloroform, ether, benzol, petroleum naphtha, amylic alcohol, bisulphide of carbon, and many fixed and volatile oils. From acid solution it is dissolved, sparingly by petroleum naphtha, freely by amylic alcohol. By nitric and hydrochloric acid it is dissolved with a yellow color; by sulphuric acid it is decomposed with formation of a red color, which is intensified by a fragment of bichromate of potassium. Fröhde's reagent reacts like sulphuric acid. On exposure to air lobelina is resinified. Its aqueous solution is precipitated: red brown, by iodine in iodide of potassium; white, by tannic acid (soluble in ammonia and in excess of precipitant); pale yellow, by potassio-mercuric iodide (slightly soluble in excess); white, by nitrate of silver (soluble in ammonia and nitric acid); white acicular crystals, by acetate of lead; yellow, by chloride of gold (insoluble in hydrochloric acid); yellow, by chloride of platinum (swimming on the surface and slightly soluble); brown, by sulphate of iron. Gallic acid produces no change; albumen is not coagulated; mercuric chloride does not affect it. Ammonia gives a white precipitate; metatungstic and picric acids also produce precipitates. Phosphomolybdic acid produces a yellowish-white precipitate, which, on addition of ammonia, changes to blue, and, on continued addition, dissolves with a faint blue color and finally forms a colorless solution, which remains unchanged by boiling.

The author has, furthermore, found, that when lobelina is boiled continuously with a dilute solution of sulphuric acid, *a certain amount of glucose is invariably formed.* Dilute solution of potassa may be used in place of the acid with the same result. This is contrary to the observation of Richardson (Am. J. Ph., iv, series ii, p. 293), who asserts that when lobelina is boiled with dilute sulphuric acid no glucose is formed.

Lobelina is also decomposed when heated at 212° F., unless it is in combination with an acid. It exists in the plant as *lobeliate of lobelina* (see *Lobelia inflata*), and this compound was prepared by the author, after the method of Procter, by mixing aqueous solutions of the two principles, concentrating slightly, and allowing the salt to crystallize out, it being but moderately soluble in water. The salt is decomposed by boiling, and on treating with acids or alkalies the lobelina undergoes the glucose fermentation. Ph. J. Trans., Jan. 19th, 1878, p. 561.

Conia—Characters.—A. Petit having had occasion to prepare a large quantity of this alkaloid according to the process of the Codex, has taken the opportunity to study its properties. The results that he has obtained as to the boiling-point, density, and rotatory power differ considerably from those of other authors. He has also arrived at the conclusion that the rotatory power cannot be depended on as an indication of the purity of the alkaloid, or of the degree of dilution when it is diluted. Commercial conia (conicine) is not as a rule diluted except by a mixture of water and alcohol. Specimens examined contained only slight traces of methyl-conia; whilst the rotatory power of conhydrin differs but little from that of conia.

The product from a large operation was distilled in a current of hydrogen. Three liquids were thus separated: (A) passing over between 130° and 140° C. (= 266° and 284° F.); (B) passing over between 160° and 170° C. (= 320° and 338° F.); and (C), the greater portion, passing over at 170° C. (= 338° F.). The operation was stopped at 172° (341.6° F.), at which point conhydrin began to distil over. The third portion (C), consisted of pure conia, the hydrochlorate and sulphate giving very closely the theoretical quantity of chlorine and sulphuric acid respectively; it was, therefore, used in the author's subsequent experiments. These determine,

(1) That the boiling-point of conia, at the ordinary pressure, is 170° C. (= 338° F.). Other experimenters have given figures ranging between 136.5° C. (= 277.7° F.) and 212° C. (= 413.6° F.). Blyth, however, has placed it between 168° and 171° C. (= 334.4° and 339.8° F.).

(2) That the density, at 12° C. (= 53.6 F.), is for the pure conia (product C) 0.846; product A having a density of 0.869, and product B 0.850 at the same temperature. Gerhardt, Pelouze, and

Wurtz gave the density of conia at 0.878, Berthelot and Dragendorff at 0.890.

(3) That the rotatory power of conia freshly prepared was equal to + 20.7°; but after keeping the preparations eight days this had diminished to equal + 10.36. Chloroform, used as a solvent, diminished the rotatory power of conia, but to a much less degree than alcohol. Ether, oil, and benzol are without action in this respect.

Pure conia (product C) can be preserved a long time without alteration. Combined directly with hydrobromic or hydrochloric acid it forms with the greatest facility very stable salts that remain unaltered at 100° C. (= 212° F.) or even 120° C. (= 248° F.). The best way to prepare these salts is to employ the colorless conia distilled in a current of hydrogen, and add to it a very slight excess of hydrobromic or hydrochloric acid. Upon evaporating slowly over a water-bath, fine, perfectly white, crystals of the respective compounds are obtained. The insoluble modification of hydrobromate of conia, noticed by Monrout, as being formed when the temperature was raised above 60° C. (= 140° F.), was not observed by the author to more than a trifling extent. Both the hydrobromate and hydrochlorate of conia are anhydrous; the first requires 2 parts of water or alcohol for solution; the hydrochlorate is a little more soluble in water, but requires 3 parts of alcohol. Ph. J. Trans., Feb. 16th, 1878, p. 648.

Nicotia—Separation by Dialysis.—P. Guyot places some tobacco-juice from a pipe into a small dialyser, and floats the latter on water. After the lapse of an hour, the latter contains the whole of the nicotia contained in the juice. Various other mixtures containing tobacco, and organic tissues containing nicotia, yielded the alkaloid to the same treatment. New Rem., Sept. 1877, p. 271; from Rép. de Ph., 1871.

Sophoria.—Dr. H. C. Wood describes this new alkaloid, which he has obtained from the seeds of *Sophora speciosa*, Benth. It is grayish white, and both in its alkaloid condition and as acetate the author failed to obtain it in crystals. A mere speck of the alkaloid, placed upon a porcelain plate, gave the following reactions: Conc. sulphuric acid, or conc. nitric acid, no color; chromic acid and conc. sulphuric acid, a dirty, deep purple, passing rapidly to a bright green, then into bluish and finally into yellowish brown; tincture of chloride of iron, a deep, almost blood-red, afterwards acquiring an orange tint; chromic acid and nitric acid, a very faint, evanescent reddish color; nitromuriatic acid, a dirty reddish brown. From the solution of its acetate compound tincture of iodine throws down a yellowish precipitate. The physiological experiments made with an alcoholic extract of the bean upon the lower animals, appear to indicate that the poison is a spinal sedative, and that it has little or no effect upon either motor or sensitive nerves. A. J. Ph., Jan. 1878, p. 33; from Philad. Med. Times, Aug. 4, 1877.

Since the above communication Dr. Wood has made some further study of the sophora bean. In the purest state in which it was obtained *sophoria is a transparent liquid*, having a highly alkaline reaction, freely soluble in water, somewhat so in ether, and very freely so in chloroform. When quite pure it is probably colorless, but, like other liquid alkaloids, it is very prone to undergo change, and it has never been obtained free from a brownish tint. Its chloride crystallizes very readily and appears to be a stable salt. With chloride of platinum it gives beautiful and peculiar crystals. When an acid is added to its watery solution, drop by drop, very marked turbidity is produced, clearing up as more of the acid is put in. Crystallization is favored by not allowing the reaction of the solution to become distinctly acid, and there is reason for believing that the crystalline salt is basic, although the author cannot speak positively upon this point. The most characteristic test is that with tincture of chloride of iron, a deep blood-red color being produced. The process by which the author obtained the alkaloid—which he thinks can be improved on—is essentially as follows: Moistening of the drug well with strong alcohol, to coagulate albuminous matter; extraction with acidulated water, concentration and treatment with carbonate of sodium, to alkaline reaction; extraction of the alkaline liquid with chloroform, and supersaturation of the alkaloid with dilute hydrochloric acid; recovery of the chloroform by distillation, evaporation of the aqueous residue to syrupy consistence, extraction of the syrupy liquid by strong alcohol, and evaporation of the alcoholic filtrate; decomposing the impure chloride with carbonate of sodium; agitation with chloroform, and spontaneous evaporation of the chloroform solution. The impure alkaloid so obtained is to be purified by again dissolving in acidulated water, and treating with chloroform as before.

The author finds, that while the action of the alkaloid upon frogs is as stated in his previous paper, its action upon mammals is less powerful than he expected. Three grains of it hypodermically failed to very seriously affect a dog, but killed a cat in a very short time. A. J. Ph., June, 1878, p. 283.

Betaïna.—R. Frühling and J. Shultz find that the mother-liquors, after treatment of beet molasses by the Scheibler-Seiferth process, being almost free from sugar, form an excellent material for the investigation of the organic compounds contained in the molasses, and they have pursued the following method for obtaining from it the alkaloid "betaïna:" The alkaline liquor, after being nearly neutralized with sulphuric acid, was evaporated, the sulphate of potassium being removed as it crystallized out. It was then treated with alcohol and sufficient sulphuric acid to precipitate all the potassium and calcium in the form of sulphates. The alcoholic solution containing the acids originally present as salts in the molasses, and other organic compounds, including the betaïna, yielded formic acid on distillation. The residue, evaporated at 100° C. (=212° F.), and exhausted with absolute alcohol, gave a brown liquid, from which the betaïna was precipitated as hydrochloride, in the crystalline state, by nearly saturating it with dry hydrochloric acid; the hydrochloride being very slightly soluble in alcohol saturated with hydrochloric acid. This method the authors consider preferable to that of Scheibler or of Liebreich. The free base may be obtained in deliquescent crystals by decomposing the hydrochloride with oxide of silver in the usual way. J. Chem. Soc., Nov. 1877, p. 627; from Ber. d. Deut. Ch. Ges.

Neurin.—This alkaloid, which may be obtained synthetically from the lecithin of eggs and from bile, has been recently used with very favorable results in the treatment of dipththeria, and will probably come into active demand. Diakonow prepares it from the yolk of eggs as follows: The yolk is extracted successively by ether and by warm alcohol; the liquids are united and subjected to distillation. The residue is boiled for an hour with baryta water in excess, the baryta is precipitated by a current of carbonic acid, the liquid is filtered, evaporated on a water-bath, at about 80° (= 176° F.), to syrupy consistence, extracted with absolute alcohol, and the filtrate treated with bichloride of platinum. A light-yellow double salt of platinum and neurin, insoluble in absolute alcohol, is formed, collected on a filter and dissolved in water. The solution of platino-chloride of neurin is now treated with sulphydric acid, the platinic sulphide removed by filtration, the filtrate concentrated, at 50° to 60° C. (= 122° to 140° F.), to a syrupy liquid, and further dried under the receiver of an air-pump, whereby the hydrochlorate of neurin may be obtained in crystals. The syrupy solution of hydrochlorate of neurin may also be dissolved in absolute alcohol and covered with a layer of ether, when the salt will likewise be obtained in crystals. To obtain the alkaloid, the hydrochlorate is dissolved in water and digested with freshly precipitated oxide of silver. The filtrate is then concentrated at a gentle heat, or better, over sulphuric acid. The method for obtaining the alkaloid from bile possesses no advantages over the above.

Neurin is a colorless, syrupy, hygroscopic alkaline liquid, which readily absorbs carbonic acid and is converted into carbonate. It is dissolved by water or alcohol in all proportions. It is not volatile, but by heat is decomposed into trimethylamina and glycol, a result which occurs already when its concentrated solutions are heated to boiling. It forms with acids salts, some of which are crystallizable, while others are deliquescent. Its compound with chloride of gold is sparingly soluble in water, insoluble in alcohol and ether. The characters of the platino-chloride are indicated by the method of its preparation. The hydrochlorate may also be obtained by adding an equivalent of chloride of potassium to the aqueous solution of the platino-chloride, evaporating the mixture to dryness, and extracting the dry mass with absolute alcohol. When the anhydrous hydrochlorate of neurin is heated with concentrated nitric acid on a glycerin bath, the neurin is converted into the poisonous alkaloid "*muscarin.*" Indeed neurin appears to be identical with *amanitin*, the non-poisonous alkaloid found along with muscarin in the fly fungus (agaricus muscarius), which likewise yields muscarin by oxidation with nitric acid. The terms *cholin*, *sinkalin*, *trimethyloxæthyl-ammonium-hydroxyd*, and *trimethyl-vinyl-ammonium-hydroxyd*, which have been applied as synonyms for neurin, are not properly so applied. These properly belong to *cholin*, which by oxidation with nitric acid forms *betaïn* (*oxyneurin*), and not muscarin. *Amanitin* and *hydroxæthyliden-trimethyl-ammonium* are the proper synonyms for neurin. Ph. Centr. H., Nov. 8th, 1878, p. 370.

GLUCOSIDES, ETC.

Parillin.—Prof. Flückiger reviews the chemical history of the saponin of sarsaparilla, and recommends its preparation by exhausting the crushed root with warm alcohol, and distilling the tincture until the residue weighs one-sixth of the root; it is then gradually mixed with one and a half times of its weight of water, and after several days the liquid is decanted from the light-yellow precipitate, which is then mixed with about half its volume of alcohol, transferred to a filter and washed with alcohol of 20 or 30 per cent. Parillin is less soluble in weak than in strong alcohol or water. It dissolves very slightly in cold, but readily in hot water, without crystallizing on cooling; from boiling alcohol, sp. gr. 0.970, it crystallizes in needles. The yield is 0.18 to 0.19 per cent. It yields with concentrated sulphuric acid a yellow solution, which, on absorbing moisture, gradually turns cherry red; warm diluted sulphuric acid colors parillin greenish, then red, and finally brown; phosphoric acid has a similar reaction, but the color is more green-yellow. The aqueous solution is precipitated by alcoholic solution of acetate of lead, by subacetate of lead. and by tannin, and when warmed reduces alkaline tartrate of copper, but does not react with other tests for sugar until after it has been boiled with a dilute acid, when the solution acquires a green fluorescence. This is best observed if a trace of parillin is dissolved in warm concentrated sulphuric acid, and disappears on dilution with water or on neutralizing with ammonia. The decomposition product, *parigenin*, is insoluble in water; the sugar appears to be partly crystallizable. Parillin is sternutatory; its acrid taste is best observed in alcoholic solution.

The author compares the properties and analytical results of parillin, and other similar bodies, like saponin, senegin, cyclamin, digitonin, which are possibly homologous compounds. A. J. Ph., Sept. 1877, p. 449; from Arch. Ph., June, 1877.

Glycyrrhizin.—J. Habermann has recrystallized commercial glycyrrhizin (prepared by Trommsdorff) from glacial acetic acid, and obtained it in hemispherical aggregations of microscopical needles, which are very easily soluble in water, also in strong but less in absolute alcohol, nearly insoluble in ether, and have an intensely sweet, afterwards somewhat acrid taste. Alcoholic solutions of it are precipitated by chloride of calcium and by acetate of lead. Boiled with very dilute sulphuric acid, a fawn-colored resinous precipitate was obtained, which had the characteristic sweet taste of glycyrrhizin. In this respect, and in the analysis, which differed to the amount of several per cent. of carbon, the author's results do not agree with those obtained by Gorup-Besanez in 1861. A. J. Ph., Sept. 1877, p. 448; from Chem. Centralbl., 1877.

Ammoniacal Glycyrrhizin.—Gustav A. Appenzeller has prepared glycyrrhizin by Roussin's method (see Proceedings, 1876, p. 571), and obtained it in form of yellowish scales having the taste of the root. By exhausting the root with diluted ammonia water, evaporating and drying on glass, a considerably larger quantity of somewhat darker-colored scales were obtained. A similar but still darker-colored preparation results if liquorice (extract) is treated in the same manner. The scales made from the root are more pleasant in taste, particularly if Russian liquorice-root, deprived of the brown cortical layer, is used. A. J. Ph., July, 1877, p. 347.

Santonin—Fusing-Point.—The fusing-point of santonin is given by the French Codex at 136° C. (= 276.8° F.), and by the German Pharm. at 170° C. (= 338° F.). H. Leroy has examined commercial santonin and such prepared by himself, and found both kinds to have the fusing-point 170.5° C. (= 339° F.). A. J. Ph., May, 1878, p. 259; from Rép. de Phar.

Santonin.—David Lindo proposes sulphuric acid and very dilute solution of perchloride of iron as a test for santonin, a fine red color being developed, which changes to a magnificent purple and then to a splendid violet as the sulphuric acid becomes more dilute. The heat produced by mixing the fluids is necessary to produce the color. When testing very small quantities of santonin, as for instance when evaporating a drop of a chloroformic solution containing one grain of santonin in the fluid ounce, it is necessary to aid the reaction by heat, the capsule being conveniently supported on the blade of a spatula, and heated by a spirit-lamp, after having covered the santonin with a drop of the perchloride of iron and sulphuric acid mixture. A very fine reaction is thus obtained. Ph. J. Trans., Dec. 15th, 1877, p. 464.

Santonin.—E. Marlett Boddy observes, that santonin is, for many reasons, by far the most efficient anthelmintic which can possibly be administered to children, but that, like every other therapeutic agent, it requires care in its administration; and if it is allowed to remain in the system it acts deleteriously, like certain cumulative medicines. According to Falk, a substance called *xanthoprin* is then produced in the system, and the author considers that to this substance the mischievous action of santonin is due. This, in his experience, can be entirely counteracted, or rather prevented, by combining the santonin with calomel, or administering the calomel immediately before and after the santonin. Ph. J. Trans., July 14th, 1877, p. 25; from Med. Times and Gaz., July 7th, 1877.

Cantharidin.—J. Piccard observed the correctness of older observations, that cantharidin becomes soft at 210° C. (= 410° F.), and fuses at 218° C. (= 424.4° F.). F. Krafft having found its vapor density near 6.60, the author doubles the usually accepted molecular formula to $C_{10}H_{12}O_4$. When heated with hydriodic acid of about sp. gr. 1.8, it is gradually converted into *cantharic acid*, which, after purification, is crystalline, soluble in 120 p. cold and 12 p. boiling water, very soluble in alcohol, sparingly in ether, and not vesicating when its solution in glycerin is applied to the skin. It has the same composition as cantharidin, but is monobasic. A. J. Ph., Dec. 1877, p. 596; ftom Ber. d. Deutsch. Chem. Ges., 1877.

Aloïns—Oxidation Products.—In continuation of his experiments hitherto noted in the "Reports" (see Proceedings, 1875, p. 153, 1876, p. 378) on the aloïns, W. A. Tilden has examined their oxidation products. When *nataloïn* is digested with a 10 per cent. solution of bichromate of potassium acidified with a proper quantity of sulphuric acid, it yields a large quantity of carbonic acid, and the liquid retains an abundance of acetic acid; but nothing else could be obtained from the solution, either by evaporating or by extracting with ether. With *barbaloïn* or *socaloïn*, however, a different result is obtained, the blood-red liquor formed depositing a brown precipitate. This precipitate, filtered off, digested for a short time with weak solution of bichromate, then collected, washed with water, dried, and dissolved in boiling spirit, deposited on cooling yellow granules, which were not perceptibly crystalline under the microscope. It is difficult to remove from this substance the last traces of chromic oxide, which the author endeavored to effect by redepositing from alcohol several times, and, finally, by solution in glacial acetic acid and precipitation with water. The new compound, which the author proposes to call:

Aloxanthin, forms an orange granular powder, which melts imperfectly at 260°–265° C. (= 500°–509° F.), subliming slowly at about the same temperature in orange scales and dust. It is but slightly soluble in water, and is reprecipitated almost entirely on the addition of an acid. It is scarcely soluble in bisulphide of carbon or chloroform, sparingly in alcohol and ether, and is best dissolved by acetic ether and by glacial acetic acid; it dissolves in solution of caustic soda, forming a bright cherry-red solution. When heated with zinc dust, aloxanthin yields a considerable quantity of a product having a greenish fluorescence and a melting-point of 203° to 205° C. (= 397.4° to 401° F.), and which appears to consist principally of *methyl-anthracene.* This agrees with the observation of Schmidt, that the aloïn of socotrine aloes yields methyl-anthracene. The results of the analysis of aloxanthin, coupled with the fact that it yields methyl-anthracene, point to the formula $C_{15}H_{10}O_3$, which would represent *methyl-tetroxy-anthraquinone.*

By the action of nitric acid aloxanthin yields a nitro acid which appears to have all the characters that belong to the aloetic acid, which accompanies chrysamic acid as a product of the action of nitric acid on Barbadoes or Socotrine aloes. Aloxanthin has no affinity for mordants. When fused with caustic potash, an indigo-blue mass, dissolving in water with a purplish color, is formed. From such solutions acids throw down a yellow precipitate, which, however, is also incapable of combining with iron or alumina, or nearly so. Aloxanthin forms insoluble compounds with baryta and with lead.

Aloïn from Zanzibar aloes, when treated with bichromate solution by the same process as that by which aloxanthin was obtained from barbaloïn and socaloïn, also yields a precipitate, which, however, is orange yellow. When purified, this substance yielded on analysis numbers which do not correspond with those found with the aloxanthin above desbribed. J. Chem. Soc., Sept. 1877, p. 264.

Mr. Tilden communicates some further experiments upon the "aloïns." The present paper describes the action of bichromate of potassium and sulphuric acid upon "nataloin," "barbaloin," and "socaloin," which appears to differ from the oxidizing action of nitric acid. With "nataloin" nothing besides carbonic acid and acetic acid appears to be produced by the action of chromic acid; but when "barbaloin" and "socaloin" are subjected to the action of the bichromate mixture, there is formed, besides carbonic and a little acetic acid, a peculiar yellow compound, which, in allusion to its yellow color, the author has named

Aloxanthin.—This is also obtainable from Zanzibar aloes, and proves to be identical as obtained from the various sources named. After purification by repeated depositions from alcohol, acetic ether, or glacial acetic acid, it was analyzed and gave numbers agreeing with the formula $C_{15}H_{10}O_6$. When heated with zinc dust it is reduced to a hydrocarbon, which proves to be methyl-anthracene. In the formula which may be deduced from the above ($C_{14}H_3(CH_3)(OH)_4O_2$), it bears close relationship to chrysophanic acid and emodin, forming the third link in a series, in which the three compounds appear as di-, tri-, and tetra-oxyderivatives of methyl-anthraquinone. Aloxanthin agrees with chrysophanic acid and with emodin in yielding a cherry-red solution with alkalies. By boiling for some time with nitric acid it is converted into chrysamic acid, the usual product of the action of that acid on the aloïn yielding aloxanthin. Yearbook of Ph., 1877, p. 567.

Aloïns—Therapeutic Value.—The fact that the crystalline constituents of the several varieties of aloes are different substances being now generally recognized, W. A. Tilden, to whom the determination of these differences is mainly due, induced Dr. Nelson C. Dobson to determine their relative power as purgatives. The conclusions at which Dr. Dobson arrived, are as follows:

Barbaloin in doses under two grains frequently produces some slight laxative action. Two grains cause a decided effect, never, however, amounting to complete purgation.

Socaloin and *nataloin* seem to be less active than barbaloin, four grains having been frequently given without producing more than slight effect.

All three are decidedly uncertain and variable in their action, and seem to present no advantage over an equal dose of aloes, except perhaps that griping was rather less common than when aloes alone was given.

The superior activity of barbaloin seems to justify the apparently general preference (in England? Rep.) for Barbadoes over the other varieties of aloes. Yearbook of Ph., 1876, p. 556.

Picrotoxin—Formula of the Pharm. Society of Paris.—The powdered berries of Cocculus Indicus are twice treated with boiling alcohol, to exhaustion, the alcohol is recovered by distillation, and the residue is boiled with water. To the boiling solution a small quantity of acetate of lead is added, to precipitate coloring matter. The liquid is rapidly filtered and the excess of lead in the filtrate is removed by H_2S. The liquid is again filtered while still warm, and evaporated, when the greater part of the picrotoxin is deposited. It is purified by recrystallization from boiling water. This substance, which is not an alkaloid, appears in the form of white prismatic needles, odorless, but of an insupportably bitter taste. It is soluble in 150 p. of cold, and in 25 p. of boiling water; in 3 p. of strong alcohol, and in 2½ p. of ether. Sulphuric acid colors it saffron-red. It does not evolve ammonia when heated with fixed alkalies (absence of nitrogen), and leaves no residue on incineration. New Rem., Sept. 1877, p. 286.

Quassiïn.—G. Goldschmiedt and H. Weidel have endeavored to obtain the *crystallizable* quassiin, described by Winkler in 1835, and subsequently by Wiggers, as having been obtained from the wood and bark of *Quassia amara*, L. With a view to avoiding the use of the large quantity of alcohol, required by the method of Winkler, the authors extracted the wood with water in which, according to Winkler, quassiin is also soluble. The aqueous extraction was evaporated to dryness, the residue redissolved in water, filtered, and the filtrate shaken with ether. The ethereal solution yielded a brown yellow, brittle resin, which was dissolved in alcohol, and the solution precipitated with alcoholic acetate of lead to remove coloring matter. The precipitate was filtered off, the filtrate treated with H_2S, and the liquid again concentrated. It yielded a yellow resinous residue, but crystals of quassiin could not be obtained, either from this alcoholic solution, from the lead precipitate, or by various other processes adopted for its preparation. The existence of quassiin in the crystalline form described by Winkler and Wiggers is, therefore, an open question.

The authors subjected the light-yellow resin to the action of melting potassa—as recommended by Hlasiwetz and Barth in their investigations of the natural resins—and obtained a melted mass, which was readily extracted by ether, and yielded crystals of protocatechuic acid. Besides the latter, acetic acid alone could be determined as product of the decomposition. Ph. Centralb., Nov. 5th, 1878, p. 58.

Elaterin.—David Lindo finds that elaterium affords a very beautiful reaction with carbolic acid and concentrated sulphuric acid. A few crystals of the elaterin are placed in a small porcelain capsule, one or two drops of liquefied crystals of carbolic acid (Calvert's No. 1, liquefied by moisture) are added, by which the elaterin is readily dissolved without production of color; if now two or three drops of concentrated sulphuric acid are allowed to flow into the mixture, an intense and beautiful carmine color is developed, changing at first to orange, and after some time to scarlet. Alkalies discharge this color. No other substance, tried by the author, gives this reaction. The addition of sulphuric acid alone to elaterin gives rise to no characteristic color. The test can be applied direct to some samples of elaterium if they are reduced to fine powder; other samples may require the powder to be agitated with chloroform and the solution filtered. A few drops of the filtrate evaporated to dryness by blowing on the surface will afford a residue for testing. Ch. News., Jan. 25th, 1878, p. 35.

Capsaicin—Since his last paper on capsaicin (see Proceedings, 1877, p. 317) J. C. Thresh has received from Messrs. Hopkins and Williams 8½ lbs. of alcoholic extract of cayenne pepper, obtained from 30 lbs. of the fruit. From this he separated 2¼ lbs. of a red fat, which appear to be composed mainly of palmitic acid. By methods previously given he separated the capsaicin of this (cayenne) variety of capsicum, and he obtained with difficulty only about 1 drachm of the pure substance. Subjected to analysis it proved to have a composition corresponding very fairly with the formula obtained by Dr. Buri from a small portion of the capsaicin which had been obtained from Natal pepper. As a microscopic examination of this pepper had led the author to infer that it was yielded by a different species of capsicum, he was anxious to discover whether the principles of both were identical, and as far as he has been able to observe, this is the case. The author gives some further reactions of capsaicin, and also of the coloring matter and the method by which the latter may be obtained. Yearbook of Ph., 1877, p. 485.

Piperin—Preparation and Determination.—Cazeneuve and Caillot recommend the following method: The ground pepper is treated with twice its weight of slaked lime and sufficient water to form a thin pasty mass, which is boiled for a quarter of an hour. By this treatment the piperin is not decomposed. The mixture is then evaporated to dryness on a water-bath, the powder transferred to a percolator, exhausted with ether, the ether recovered by distillation, and the residual fluid allowed to evaporate spontaneously. The piperin crystallizes out gradually and is purified by recrystallization from hot alcohol. By this method they have determined the following percentages of piperin in various peppers:

Sumatra—average of 4 samples, . . .	8.10 per cent.
Singapore—black, ...	7.15 per cent.
Singapore—white, ...	9.15 per cent.
Penang, ...	5.24 per cent.

White Penang pepper yielded, as did the white Singapore pepper, a larger percentage of pepper than did the black, by which it appears evident that the piperin is contained in the kernel and not in the skin of the berry. Ph. Centr. H., Sept. 13th, 1877, p. 299.

Cubebin.—According to Weidel, cubebin ($C_{10}H_{10}O_3$) is by nitric acid converted into oxalic and picric acids, while it yields, with nitrous acid, small yellow crystals of $C_{10}H_9\,(NO_2)\,O_3$, which are soluble in ether, alcohol, ammonia, and potassa; the latter solution having a purple color. If cubebin is dissolved in chloroform, and bromine added, drop by drop, $C_{10}H_7Br_3O_2$ separates, which is insoluble in the common solvents, and obtained in white crystals from boiling xylene. When fused with HKO, carbonic acid, acetic acid, and protocatechuic acids are obtained; the same products were yielded, under similar circumstances, by ferulic acid and eugenol, into which compounds, however, cubebin could not be converted. A. J. Ph., May, 1878, p. 257; from Wien. Akad. Ber., 1877.

Vanillin.—Ch. Rump is of opinion that the estimation of the value of vanilla, by Tiemann and Haarmann, based upon the quantity of vanillin (crystalline) separated from it is incorrect. Good fresh vanilla contains no crystals whatever. The author is inclined to the belief, that vanilla contains a body that does not contain vanillin ready formed; that this body contains the elements to form vanillin, and that it has the flavor of vanilla to a much higher degree than has pure vanillin. Ph. Centralh., June 27th, 1878, p. 237.

Vanillin—Narcotia a Source.—During the course of their researches upon the opium alkaloids, and more especially upon narceia, narcotia, and oxynarcotia (which see), C. R. Alder Wright and G. H. Beckett have demonstrated that vanillin may be obtained from narcotia, although it yields it in but small quantities. The steps in the operation are as follows:

1. By cautious oxidation with binoxide of manganese and sulphuric acid narcotia furnishes, as is well known, opianic acid.

2. Opianic acid, when converted into sodium salt and cautiously heated with an intimate admixture of dry sodalime, furnishes a distillate from which, by fractional distillation, a crystalline body melting at 41° C. (= 105 8° F.) and boiling at 283° C. (= 541.4° F.), can be separated; this body is *methyl-vanillin* (dimethyl-protocatechuic aldehyde).

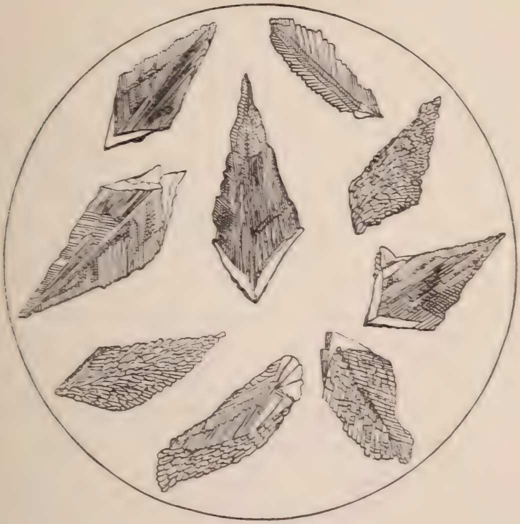
3. By heating methyl-vanillin with hydrochloric acid, chloride of methyl and *vanillin* (monomethyl-protocatechuic aldehyde) is formed. Yearbook of Ph., 1876, p. 517.

Artificial Vanillin.—Tiemann has patented a process in England which depends upon the conversion of eugenic acid into aceto-eugenol by boiling with acetic-anhydrid. The newly formed compound is treated with a very weak warm solution of permanganate of potassium, the solution filtered, rendered slightly alkaline, concentrated, acidulated, and the vanillin extracted with ether. A. J. Ph., May, 1878, p. 256; from Ber. d. Deut. Ch. Ges., 1877.

Meconoiosin—A New Derivative from Opium.—Messrs. T. and H. Smith draw attention to a new derivative from opium to which they have given the name *meconoiosin*. In the final isolation of meconin, the oleaginous-like liquid containing it, upon being left to itself for some days, sets into a mass of crystals. These crystals, upon being drained and cautiously washed with cold weak spirit, are to be boiled in a large quantity of water. The filtrate gives a crystallization of meconin, and the mother-liquor, when concentrated, and upon being set aside for a time, yields beautiful leaf-like crystalline masses of the new body. The remarkable crystalline form (see Fig. 86) which, in its impure state, is assumed by meconoiosin, as well as the brown color of the crystals, enables the body to be readily distinguished from the soft and nearly white meconin, which crytallizes along with and upon it, in a manner not unlike the incrustation of minute shells upon a rock. If this meconin be now removed, the meconoiosin, by means of a few crystillizations from hot water, with the aid of charcoal, may be obtained in the pure state, free from color.

The new substance is especially interesting, because it is now the second chemically indifferent body (meconin having been the only one hitherto) that has been separated from opium. Its formula is, $C_8H_{10}O_2$; that of meconin, $C_{10}H_{10}O_4$. While the latter is very sparingly soluble in cold water, and even in boiling water only at 1–50, meconoiosin is soluble in 27 parts of cold, and to any extent in boiling water. Meconin heated with slightly diluted sulphuric acid and evaporated to a certain point, produces a beautiful green color. Meconoiosin, under the same circumstances, produces a deep red color, becoming purple. Ph. J. Tr., June 8th, 1878, p. 901.

FIG. 86.



Meconoiosin.

Spergulin—A New Fluorescent Body.—Dr. C. O. Harz discovered, a little over a year ago, in the seeds of *Spergula vulgaris* and *S. maxima*, a peculiar, magnificently blue fluorescent body, to which he has given the above name. The author has since repeated and supplemented his experiments with larger quantities of material, and has succeeded in isolating it in a dry condition. The new body appears to be present only in the seed-coat, the embryo and albumen being entirely devoid of it. The testa being carefully removed from the embryo and albumen, the quantity obtained from 100 or 200 seeds is carefully dried between blotting-paper and then extracted with alcohol. Upon the addition of basic acetate of lead the spergulin is completely precipitated from its alcoholic solution, forming a heavy brownish or olive-colored precipitate, which is washed with water suspended in alcohol, and treated, preferably, with diluted sulphuric acid. On evaporation of the alcohol from the filtrate spergulin remains in the form of an amorphous, brown mass, and possesses all the characters that are possessed by the body in the original tincture.

The new body is readily soluble in ethyl alcohol, more so in strong or warm than in that liquid cold or dilute. It is also readily dissolved by methyl alcohol, with more difficulty in amyl alcohol, and scarcely in petroleum or in ether. Aqueous ether dissolves it with difficulty, but it is more readily soluble in alcoholic ether. The fixed oils, volatile oils, benzol, chloroform, cold or hot water, phenol, bisulphide of carbon, and dilute organic or mineral acids also do not dissolve it; but concentrated sulphuric acid dissolves it with handsome dark-blue color. Its alcoholic solution is transmitted by light colorless to faint greenish or olive-brown; but by reflected light it exhibits intensely dark-blue fluorescence, much stronger than that exhibited by all other blue fluorescent bodies, with the exception, perhaps, of phyllocyanin. Upon the addition of small quantities of caustic alkalies, ammonia, or other carbonates, the blue fluorescence is changed to a magnificent emerald-green one, and the solution then exhibits a greenish color by transmitted light; but in a short time the fluorescence is completely lost. The new body shows a certain analogy to the chlorophyll bodies, particularly to phyllocyanin. Some of its reactions point to a faint acid body, the salts of which have a green fluorescence, while its basic compounds lose this property altogether. J. Mayerhofer has made an elementary analysis and has obtained numbers corresponding to the formula $C_5H_7O_2$, and differing from the formula given by Verdeil for the chlorophyll of grasses ($C_5H_6O_2$) by one atom of H. Zeistchr. Œst., Ap. Ver., No. 10, 1878, pp. 149–152.

COLORING MATTERS.

Indigo—Determination in the Presence of Per- and Proto-salts of Iron.—The most reliable method for estimating indigo, depending on its oxidation into isatin, etc., by means of an oxidizing body, such as permanganate of bichromate of potassium, a difficulty naturally presents itself when per- and proto-salts of iron are present. This difficulty has been overcome by Hugh M. Wilson, by taking advantage of the circumstance that sulphindigotic acid is completely precipitated by the addition of a soluble salt of barium, a complete separation from the iron salts being then effected. The author prepared a solution of indigotin and added weighed quantities of a proto- and per-salt of iron. A portion of this was treated with chloride of barium, the precipitate of indigo and sulphate of barium was removed by filtration and washed, and the filtrate and washings were then titrated with a standard solution of permanganate of potassium, the consumed quantity of which corresponded to the quantity of proto-salt used. The solution, now containing the whole of the iron as per-salt, was treated with ammonia, the precipitated peroxide was washed, dried, and ignited, and was found on weighing to correspond to the total iron salts employed. A second portion of the solution of indigo and salts of iron was now titrated with the permanganate solution, and the amount consumed proved to correspond to the quantity of indigo and proto-salt of iron contained in it. The method is, therefore, available, not only for the accurate determination of the indigo, but also for the separation and accurate determination of the salts of iron in indigo solutions. Ch. News, Dec. 28th, 1877, p. 279.

Indigo Blue from Polygonum Tinctorium.—Edward Schunck, at a meeting of the Manchester Literary and Philosophical Society, communicated an account of some experiments he had recently made with *Polygonum tinctorium*, a plant employed by the Chinese for the manufacture of indigo, his object being to ascertain whether the coloring matter is contained in this plant in the same form as in *Isatis tinctoria*, viz., as a glucoside. His experiments lead to the conclusion that the leaves of *P. tinctorium* contain a substance which cannot be distinguished from the *indican* of the woad plant. It is amorphous, soluble in water, alcohol, and ether, and by the action of acids is decomposed into indigo-blue and a substance giving the reaction of glucose, probably indigneine. When its watery solution is boiled or left to stand for some time, it undergoes a complete change, and then no longer yields indigo-blue by decomposition with acids, but indigo-red and other products, indican, as formerly shown by the author, undergoing a similar metamorphosis under the same circumstances. The author recommends for the preparation of this substance the following process: The leaves of the plant having been carefully dried are ground to powder and extracted with alcohol. The green alcoholic extract is evaporated at the ordinary temperature, a current of air being employed to assist evaporation. The brown watery liquid left is filtered to remove the deposited chlorophyll and fatty matters, and mixed with acetate of lead solution. This gives a copious dirty yellow precipitate, which is filtered off. Basic acetate of lead is now added, the primrose-yellow precipitate produced is filtered off, washed with water, then with alcohol, and suspended in absolute alcohol. On passing a current of carbonic acid gas through the liquid the precipitate is decomposed, carbonate of lead is deposited and the coloring matter dissolved. The filtrate is evaporated in a current of air, the residue dissolved in water, the solution treated with sulphuretted hydrogen, and the filtrate again evaporated. The residue is now treated with ether, filtered from the small portion of undissolved matter, and on evaporation yields the indican as a yellow amorphous residue.

The author's experiments prove that the fresh leaves of the plant contain no coloring matter ready formed, with the exception of chlorophyll. He has found indican also in *Bletia tankervillia,* which, as well as another orchidaceous plant, *Callanthe veratrifolia,* has long been known to yield indigo-blue. He is of the opinion that the latter plant also contains indican.

The author also draws attention to the observation that tyrosin appeared among the constituents of an alcoholic extract of dried woad, which had undergone partial decomposition, and that while the tyrosin may have pre-existed in the woad ready formed, he is of the opinion that, like the leucin previously found by him, it is a product of decomposition. Ch. News, May 31st, 1878, p. 223.

Indigo Carmine—Preparation.—V. Joclét gives the following process: 1 kilo of powdered good Bengal indigo is gradually added to 5 kilos of strong sulphuric acid, heated in a water-bath to 45° to 50° C. (= 113° to 122° F.). When dissolved, the liquid is poured into a suitable vessel, and for every kilo there is slowly added a solution of 3 kilos of crystallized sal soda dissolved in 30 kilos of water. The mixture is occasionally stirred during 12 hours to facilitate the extrication of the carbonic acid gas, set aside for some time, and then passed through a woollen filter, the filtrate being collected. The contents of the filter are transferred to a vessel with an inner perforated bottom, upon which a strainer is placed, and more indigo carmine solution obtained and withdrawn by means of a stopcock. Finally indigo purple remains in the filter. A. J. Ph., May, 1878, p. 258; from Ch. Centralbl., 1878.

Œnolin.—E. Varenne communicates the following rapid method for obtaining this coloring matter of red wines, which was first obtained by Glenard (1858). The wine, or better, the lees, is treated with sufficient lime to form a thin magma, which soon acquires a blackish-gray color; it is then transferred to a strainer, washed with water, mixed with alcohol of 95 per cent., and treated with sufficient dilute sulphuric acid to neutralize the lime. The œnolin is liberated and taken up by the alcohol; the solution is filtered, the residual sulphate of calcium washed with alcohol, and the united filtrate and washings distilled to recover the alcohol. Finally the residue is evaporated to dryness, and constitutes a black mass, which, when powdered, resembles powdered cochineal. It is the most appropriate coloring matter for communicating a deeper color to red wines, as it dissolves with a handsome red color. Zeitsch. Œst. Ap. Ver., No. 11, 1878, p. 171; from Bullet. Soc. Chim. de Paris, Feb. 1878, p. 109.

Chrysolin—A New Yellow Dye derived from Resorcin.—F. Reverdin draws attention to a coloring matter, which has been prepared since March, 1877, at the works of MM. P. Monnet & Co., at Geneva, and which is formed by the simultaneous action of phthalic and sulphuric acid upon benzyl resorcin. The latter is obtained very readily either by causing the chloride of benzyl to act upon resorcin in presence of a small quantity of zinc powder, or by heating an alkaline and alcoholic solution of resorcin with chloride of benzyl, or, also, by heating a mixture of 1 mol. of resorcin and 2 mol. of chloride of benzyl to about 150° C. (= 302° F.) in the oil-bath. The *benzyl-resorcin* obtained is a strongly-colored oil, very thick, insoluble in water, in which it sinks; it distils at a very elevated temperature, with partial decomposition. It dissolves in alcohol with a yellow color, and the solution has a decided green fluorescence. It also dissolves with a yellow color in benzol, chloroform, and ether. The previous preparation of benzyl-resorcin is, however, not necessary when preparing chrysolin. In the establishment mentioned, 460 grams sulphuric acid and 1 kilogram of common phthalic acid are heated in a retort of enamelled cast iron to 130° to 140° C. (= 266° to 284° F.) in an oil-bath, by which operation the phthalic acid is converted into phthalic anhydride; 1 kilogram of resorcin, 460 grams of sulphuric acid, and 1 kilogram of chloride of benzyl, are then introduced into the retort, which is now gently heated on a water-bath; the heat being removed when hydrochloric acid begins to escape, and the reaction then continues spontaneously. When no more hydrochloric acid is evolved, which may ensue in three or four hours, the reaction is completed by heating for 12 hours in the oil-bath to 135° to 145° C. (= 275° to 293° F.). It is then allowed to cool, the solid mass broken up, dissolved by boiling for a considerable time in dilute caustic soda, the solution filtered, the acid coloring matter precipitated by hydrochloric acid, washed with cold water, dissolved by the aid of sufficient carbonate of sodium to saturate the acid, and evaporated to dryness. The coloring matter so formed, and which is named chrysolin, is the *soda salt of benzylated fluorescin.* Chrysolin appears, as a mass, with green metallic reflections, but is red-brown when reduced to powder. It is soluble in water and alkalies; its solutions, which present a magnificent green fluorescence, are precipitated by acids in yellow flocks. It yields bromated, iodated, and nitro-derivatives, which are all beautiful coloring matters. It may be fixed directly upon silk or wool, but the latter is preferably mordanted in a beck of acetate of lead and alum. Cotton is mordanted with sulphate of alumina and dyed at a hand-heat. The shade approaches that of turmeric, and it resists light as well. Ch. News, Sept. 21st, 1877, p. 136; from Monit. Scientifique.

ALBUMINOIDS.

Albumen—A New Method for obtaining a Stable Liquid Albumen from Blood Serum.—Charles T. Kingzett and M. Zingler have communicated a paper to the British Pharm. Conf., in which—after drawing attention to the fact that hitherto egg-albumen alone has been used as a mordant for the purer and brighter shades of color in calico printing, to the methods and the difficulties attending them, of preparing dry albumen—they give the method pursued by them for preparing a stable *liquid albumen* from blood serum, of such purity that it can readily be substituted for egg albumen, over which, in fact, it appears to possess some advantages. The method is (in England) protected by letters-patent, and it may be conducted upon blood itself, or defibrinated blood produced by whipping, or preferably, upon the serum of blood prepared by allowing the coagulated blood to drain through cloths in suitably constructed vessels. When conducted upon the serum of blood, the product contains about 17 ounces albumen to the gallon (the original serum contains 15 ounces to the gallon), and this solution is strong enough for many purposes; but for certain purposes it should contain 30 to 40 ounces to the gallon, and such a strength may be obtained by dissolving in the serum before treatment the requisite amount of commercial dried blood albumen. In any case the solution to be treated is placed in a suitable apparatus, and to it is added about 5 per cent. of crude turpentine; into the mixture, maintained at about 30° to 60° C. (= 86° to 140° F.), a current of air is blown rapidly, the turpentine which is carried over as vapor being condensed by suitable means, and continually returned to the mixture. After a period varying (according to the quantity to be bleached) from two to ten hours, the operation is concluded, and all that remains to be done is to allow the product to settle, siphon off the albumen solution from any residual oil, and complete the operation by filtration through French gray paper. In this way albumen solution is obtained which will keep well during the whole of the hottest summer, without the slightest decomposition, and which is as white as egg albumen.

The authors were led to this discovery by experimenting with the solution of "Sanitas," the constituents of which are peroxide of hydrogen, camphor, camphoric acid, and other substances, resulting from the aerial oxidation of turpentine. These substances are, in the process of the authors, produced *in situ.* It must be remarked in this connection that the presence of even traces of phenol is sufficient to prevent the bleaching of blood albumen, either directly by "Sanitas" or by the oxidation process described. Yearbook of Ph., 1877, p. 610.

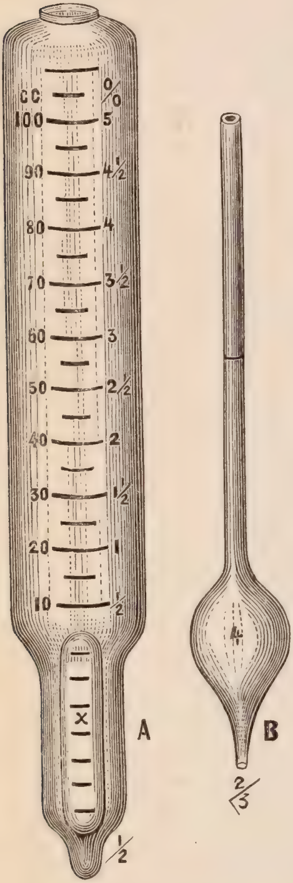
Dried Soluble Blood.—G. Le Bon has succeeded, by the aid of a specially constructed apparatus, to evaporate blood to powdery dryness, and to obtain it in a condition in which its component parts remained unchanged. The evaporation was conducted at the temperature of the human body and in a partial vacuum. A sample of this powder, 18 months old, yielded, upon shaking with water and filtering, a handsome red liquid which had all the properties of defibrinated blood, was precipitated by heat, and exhibited the two characteristic absorption bands of hæmoglobin. Brought into this form, blood may serve an excellent purpose in therapeutics. Arch. Ph., July, 1871, p. 91.

Condensed Milk.—A writer in a Cologne paper makes the following comparison:

Cond. milk of Cham contains for	100 albuminates	63 fat and	375 sugar.
" " Kempfen "	100 "	66 " "	221 "
Woman's milk "	100 "	62 " "	147 "

The amount of sugar in condensed milk is thus shown to be double and even nearly three times as large as in woman's milk. For this reason Prof. Kehrer, Dr. Daly, and other physicians consider the former as not only not beneficial, but even injurious to infants, the sugar being transformed into lactic acid in the intestines, causing summer complaint and other diseases. In their experience fat and healthy children may be raised on condensed milk, who, however, will never equal in strength and resistance to disease those who were raised on woman's or fresh cow's milk. A. J. Ph., June, 1878, p. 296; from Pharm. Post, Feb. 1878.

Fig. 87.



Feser's Lactoscope.

Feser's Lactoscope. — Alb. Huber draws attention to the lactoscope of Prof. Feser, whereby the quality of the milk is ascertaind by the degree of its opacity, and the percentage of fat is also conveniently determined. The hollow cylinder, A (Fig. 87), is provided with two scales, the one indicating c c, the other percentages. In the lower part of the cylinder a cylindrical body of milk glass (x), graduated with black lines, is placed. When using the instrument the pipette, B, is filled with milk to the line in the upper part of the stem (4 c c), and the milk is then transferred to the cylinder. Water is now added in small quantities, and the mixture shaken after each addition, until the black lines on the body of the milk glass are visible. The quantity of water that has been added is then read off on the c c scale, while the height to which the column reaches indicates the percentage of fat on the percentage scale. Ph. Centralh., No. 2, 1878, p. 21.

Milk—New Analytical Method.—H. Ritthausen adds to the diluted milk a solution of sulphate of copper, followed by sufficient caustic potassa or soda solution to *exactly* decompose the quantity of copper salt used. The liquid must not react alkaline. By this treatment the protein bodies are completely precipitated and the filtrate contains the lactose, which is determined by well-known methods. Besides the protein bodies, the copper precipitate contains all of the fat, which is removed by ether and determined. The well-washed precipitate is then dried, weighed, heated to redness, and again weighed. The loss determines the quantity of the protein substances. The water is determined by the well-known method of evaporating the milk by the aid of pure quartz sand. The quantity of salts are determined by differences. Ph. Central. H., Oct. 18th, 1877, p. 347.

Milk—New Method of Determining Casein and Fat.—Jul. Lehmann recommends a method which is dependent on the fact that porous tiles of clay absorb the serum completely and leave the casein and fat upon the surface, the casein being obtained in the same condition as when it is coagulated by rennet. Water is poured on the clay-tile, which is then introduced into a glass vessel, the bottom of which is covered with a thin layer of concentrated sulphuric acid. The milk, previously diluted with an equal weight of water, is now poured upon the centre of the tile. After several hours the casein and fat may be removed by means of a horn spatula and its weight determined when constant at 105° C. (= 221° F.). The dry product is powdered, triturated with ether, transferred to a dry weighed filter, completely exhausted with ether, dried and weighed. The difference in the weight is the fat. The present weight, after deducting the ash, is the casein. Ph. Central. H., No. 16, 1878, p. 148.

Milk — Estimation of Casein.—L. Manette and G. Musso propose a modified method of determining the casein in milk, which in certain cases is easier of execution than other processes, and furnishes sufficiently accurate results, provided the amount of salts accompanying the casein be separately determined by ignition and deducted. The method is as follows: 50 grams of the milk, which should have acquired the proper degree of acidity for making cheese, are weighed into a porcelain capsule and the latter is placed on a water-bath, containing water heated to 50°–60° C. (= 122°–140° F.), and left there until the milk has acquired a temperature of 39°–40° C. (= 102°–104° F.). A few drops of glycerin solution of rennet are then added, the mixture is stirred with the thermometer and kept at a temperature of 35°–40° C. (= 95°–104° F.). A few minutes after coagulation has set in, the mass is cut with a spatula and the color of the exuding serum noticed. If the latter oozes out quickly and has a citron-yellow color, the coagulation is complete; otherwise it is necessary to wait until such is the case. The liquid is poured off upon a gray filter, which had better be placed on a hot filtering apparatus. Lukewarm water is poured upon the mass and the latter stirred to break it up, and the liquid also poured upon the filter. The filter is now drenched with a few cc. of a mixture of ether and alcohol, 40–50 cc. of absolute or concentrated alcohol are then poured upon the mass in the capsule, heated to boiling on the water-bath (the capsule being covered with a glass plate), and the boiling alcohol is poured on the filter. This is repeated until no more fat is extracted. The particles of casein have by this time assumed a horny condition. They are washed a few times with ether, which is also poured upon the filter; the latter is spread out upon a plate of glass, the particles of casein adhering to it are transferred to a watch-glass, to which is also added the portion remaining in the capsule. The watch-glass with contents is then dried in an air-bath at 115° C. (= 239° F.) and weighed. A weighed quantity of this is ignited in a crucible, the amount of ash calculated for the total quantity of casein and deducted. The remainder represent the correct weight of casein. New Rem., Nov. 1877, p. 333; from Zeitsch., f. Anal. Ch., 1877.

Pure Alcohol Yeast.—Pasteur has shown that the diseases of beer are due to microscopic organisms, which are not capable, like yeast, of inciting alcoholic fermentation, but cause the formation of lactic acid, acetic acid, etc. Moritz Traube has now succeeded in preparing a perfectly pure alcoholic yeast by a simple method, the result of an extensive series of experiments, from which he draws the following conclusions:

1. The development of bacteria, and all other germs of disease, and even the Mycoderma vini, is retarded materially in fermenting liquids by the presence of small quantities (2.8 per cent.) of alcohol, while larger quantities (5.6 per cent. and over) prevent such development completely.

2. The development of yeast germs is also retarded by the addition of alcohol, but will still take place in liquids containing 8.2 per cent. of alcohol.

3. Hence *pure yeast* only is formed in liquids containing from 5.6 to 8.2 per cent. of alcohol.

If, therefore, a small quantity of pure yeast (free from bacteria) is produced according to 3, any desirable quantity may be produced by introducing the product into suitable fermentable liquids, which have been previously boiled, without the introduction of alcohol, as has been proved experimentally by the author. Arch. Ph., July, 1877, p. 81.

Pepsin.—Andouard scrapes the inner coat of the stomach, and adds to the mass table salt to precipitate the pepsin as proposed by Scheffer. The precipitate is put upon a dialyser to free it from chloride of sodium; pepsin again dissolves, and is mixed with an equal weight of glycerin. This solution keeps well, and its activity is not impaired by keeping it for two years without special precautions. A. J. Ph., Dec. 1877, p. 599; from J. de Ph. et de Chim., 1877.

Gastric Juice—Functions.—The successful operation of gastrotomy, performed by Prof. Verneuil in the case of a young man, who suffered from complete stricture of the œsophagus, has enabled Ch. Richet to study the functions of the gastric juice, taken through the fistula formed direct from the living stomach. He found the secretion to be a colorless, ropy liquid, which filters readily, has a faint odor, and does not putrefy on standing. The results of the author's experiments with this liquid, which have so far been confined to accurate determinations of its acidity during varying periods of its physiological activity, are summed up by him in the following:

A. The mean acidity of the gastric juice, in its pure condition or mixed with food, corresponds in 1000 grams of the liquor to about 1.7 grams hydrochloric acid. Less than 0.5 gram and more than 3.2 grams was never found.

B. The quantity of fluid in the stomach has no influence on its acidity; whether it be nearly empty, or overloaded with food, its acidity remains about the same.

C. Wine and alcohol increase the acidity; sugar diminishes it.

D. When acid or alkaline liquids are introduced into the stomach, the contents have a tendency to reassume their normal acidity, so that in the course of an hour the former relation is again restored.

E. When the act of digestion is at rest, the gastric juice is less acid than during the process of digestion.

F. Towards the end of the process of digestion the acidity of the gastric juice is slightly increased.

G. The sense of hunger and thirst is not dependent either on the quantity of acid or the emptiness of the stomach.

The author expects to continue his researches and is now engaged in determining the nature of the free acid in the gastric juice. Zeitschr. Œst. Ap. Ver., Dec. 1st, 1877, p. 542; from Journ. de Méd. de Bruxelles, April, 1877.

Pancreatin.—(Formula of the Paris Pharmaceutical Society).—Pancreas is freed from foreign matters, bruised and mixed with water containing some chloroform to prevent decomposition. After some time the mass is expressed and the liquid filtered and evaporated rapidly in shallow dishes by means of a current of air, at a temperature not exceeding 45° C. (= 113° F.). 0.10 gram of pancreatin digested with 5 grams of fibrin and 25 grams of water, at a temperature of 50° C. (= 122° F.) for 12 hours, yields a solution which, when filtered, is scarcely rendered turbid by the addition of nitric acid. 0.10 gram of pancreatin, added to 100 grams of paste containing 5 grams of starch, yields a liquid which filters easily and decolorizes 4 times its volume of Fehling's solution. A. J. Ph., July, 1877, p. 351.

Peptone.—According to Hobe, the best process for preparing the so-called peptone, or pancreatic meat solution, is due to Dr. Adamkiewicz. Fresh blood is converted into a colorless mass by quirling and protracted kneading, followed by washing with frequently renewed soft water, holding in solution a small quantity of ammonia. The pressed white fibrin thus obtained is comminuted into fine shreds in capacious dishes, and covered with a large quantity of water containing 0.2 per cent. of hydrochloric acid. The fibrin thereby soon swells up, and gradually becomes converted into a pellucid jelly, which is now ready for the addition of the ferment, namely, pepsin. The latter is obtained from the mucous membrane of the hog, and for the present purpose is preferably extracted by means of glycerin. Alcohol is first added to the finely cut membranes, in order to coagulate the albumen, after which they are dried by exposure to air, and then covered with glycerin, which abstracts the pepsin in the course of a few weeks. The clear yellowish-red *glycerole of pepsin* is poured over the *fibrin jelly*, and the whole heated for some time in a water-bath at a temp. of 50°–60° C. (= 122°–140° F.). The compact mass soon begins to liquefy, and is converted finally into a thin fluid of a gray opalescent color. In from 2 to 5 hours large masses of fibrin may in this manner, as it were, be digested. The crude liquid is now separated by straining from any undigested shreds, and carefully neutralized with carbonate of sodium, which causes the separation of a flocculent gray precipitate, the so-called *para-peptone.* This is removed by filtration. The filtrate, which has a clear straw-yellow color, is faintly acidulated, once more filtered and evaporated to the consistence of honey at a temperature not exceeding 70° C. (= 158° F.). Peptone is distinguished from ordinary albumen by its proneness to solidify in the cold, and to return to a liquid state when heated. It is recommended to be administered with extract of beef—5 parts of the latter to 100 of peptone. One tablespoonful of this peptone (16 grams) is equal, in nutritive power, to 20 grams of lean meat.

Dry peptone may be prepared by precipitating the original liquid with alcohol, treating the precipitate repeatedly and for some time with alcohol and ether, dissolving it in a little water, and drying at 30° C. (= 86° F.). It forms a glassy, brittle mass, easily soluble in water, but long keeping is said to impair its solubility. It is neutral, and reduces alkaline copper solution. New Rem., Feb. 1878, p. 46; from Phar. Zeitung, 1877.

URINARY AND BILIARY COMPOUNDS.

Urine—Glucose a Normal Constituent.—Some time ago Pavy communicated to "Med. Centralblatt" a paper, in which he maintained that glucose is a normal constituent of urine, although present in but very small quantities (0.05 gram per liter). Hager, who has had frequent opportunities to examine urine, and who had made special experiments to determine its presence in the urine of healthy persons, arrives at the conclusion that glucose may be regarded to be a normal constituent of the urine of old persons, while in that of young persons it is not present. Ph. Centr. H., July 19th, 1877, p. 233.

Urine—Reaction for Sugar.—E. Külz has observed that a sample of urine, in which the polarimeter indicated the presence of 4.8 to 5.8 per cent. of sugar, when treated by Trommer's test, failed to produce even the slightest precipitation of cuprous oxide. Upon diluting 2 drops, however, with 10 cc. of water, and repeating the experiment, cuprous oxide was immediately deposited. He explains this difference by the assumption, that the substances which in the undiluted urine prevent the precipitation, are paralyzed in their action on dilution. Dr. Wittstein, referring to this observation, remarks that he has never noticed this remarkable behavior of urine. He recommends that the urine be strongly supersaturated with solution of potassa, filtered to remove the alkaline earths precipitated, and then treated with alkaline solution of copper in the usual way. Zeitschr. Œst. Ap. Ver., July 20th, 1877, p. 341.

Urine—Modification of Boettger's Test for Sugar.—Professor Brücke proposes the following: The urine is slightly acidulated with muriatic acid, and an acidulated solution of bismuth; potassium iodide is added, whereby all traces of sulphide are removed; the clear filtrate is then rendered alkaline by strong potassa solution and boiled a few minutes, when the presence of sugar will be indicated by a gray or black coloration. A. J. Ph., Sept. 1877, p. 445; from Ph. Centr. Halle.

Urine—Determination of Sulphuric Acid.—The occurrence of homologous sulphur acids in urine renders the usual method of determining sulphuric acid (precipitation with chloride of barium) uncertain. E. Bauman finds that none of these sulphur acids are decomposed when heated for an hour with diluted acetic acid, but that they are all split, when they are heated a few minutes in solution containing small quantities of hydrochloric acid, or if allowed to stand in the latter solution for several hours at the ordinary temperature. The sulphuric acid, contained in saline combination in the urine, can, therefore, only be precipitated from its acetic acid solution. 25 or 50 cc. of urine are treated with acetic acid, an equal volume of water, and chloride of barium in excess, and heated on a water-bath until the precipitate has settled completely. The precipitate is collected on a filter, is washed with water, then with dilute HCl, and finally again with water; its weight gives the amount of sulphuric acid present in saline combination. To the filtrate and washings some diluted HCl is added, the mixture is heated, and the precipitate collected on a filter. It contains besides sulphate of barium a brown resinous substance, which is removed by washing with hot alcohol; finally the precipitate is washed with hot water, and gives the quantity of homologous sulphur acids present. Ph. Centralh., Nov. 15th, 1878, p. 137.

Urine—Separation of Carbolic Acid.—Prof. Dragendorff has found that urine yields any carbolic acid it may contain to petroleum-ether. Experiments were made to determine whether normal constituents of urine, or the addition of sulphuric acid to such, yielded anything to petroleum-ether that would interfere with the reaction. Normal urine yielded nothing to interfere. By the addition of 10 cc. of dilute sulphuric acid (1:10) to 100 cc. of urine, the pretroleum extraction—when evaporated spontaneously—also showed indifference, or but slight reaction upon the reagents for carbolic acid below mentioned. When 0.1 gram of carbolic acid was added to the urine, the mixture shaken with petroleum-ether, the latter solution evaporated at the temperature of the room on watch-glasses, and the residues dissolved in a few drops of water, perfect reactions for carbolic acid were obtained with (1) ferric chloride, (2) bromine water, (3) chlorinated lime and ammonia, and (4) with a solution of mercuric nitrate containing some nitrous acid. Prof. Dragendorff's assistant, Mr. Kosson, made experiments in the same direction using ether for the extraction of the carbolic acid. Satisfactory results were also obtained, but the author gives the preference to petroleum-ether, because the latter, in presence of sulphuric acid, takes up less of the constituents of urine that interfere with the reaction for carbolic acid. Experiments were also made to determine whether the reactions for carbolic acid could be made with the urine direct, but these resulted in the negative. Arch. Ph., April, 1878, p. 298.

Urine—Testing for Tyrosin and Leucin.—In acute atrophy of the liver the urine contains almost uniformly large quantities of leücin and tyrosin, while the normal constituents of the urine are present only in small quantities. Frerichs recommends the following method for the determination of these substances, whereby they are obtained more abundantly than by the usual methods: The urine is precipitated with subacetate of lead to remove coloring and extractive matters, filtered, treated with H_2S to remove excess of Pb, and concentrated by evaporation After standing 24 hours, sufficient tyrosin will have crystallized out to enable its perfect characterization by the necessary tests.

To determine the leucin, the residue of the evaporation is first completely extracted with cold absolute alcohol, and then with boiling ordinary alcohol; the residue contains the tyrosin which has not crystallized out; the solution obtained by boiling ordinary alcohol is evaporated to syrupy consistence, when, upon standing for some time, globular crystals of leucin are deposited, which are pressed between paper and recrystallized from water.

If the urine contains albumen, this must first be coagulated by heat and separated by filtration. Zeitschr. Œst. Ap. Ver., Dec. 1st, 1877, p. 550.

Urea—New Method for the Quantitative Estimation.—Dr. George B. Fowler proposes a new and simple method of estimating urea, which may be briefly stated to be dependent on the difference in specific gravity of a mixture of urine and solution of chlorinated soda, as ascertained by calculation, and of the specific gravity of the mixture after the reaction. Urea consists of 7-15 by weight of nitrogen, therefore almost one-half of the urea in the solution will disappear by the well-known reaction of the hypochlorite upon it, and the author has found that for every 7.791 milligrams of urea per cubic centimeter so decomposed, one degree on the hydrometer, constructed as described in the following, was lost. The hydrometers should be constructed in sets of two, the one reading from 1.000 to 1.025, the other from 1.025 to 1.050. The twenty-five divisions on each hydrometer, which for the purpose of the author indicate each *one degree*, should be each about two millimeters (one-twelfth of an inch) apart, in order to allow accuracy in the reading. The method then is as follows: "Procure two cylinder jars, one about nine inches in height by one and a half in diameter, the other about seven inches by one inch. Into the smaller pour a quantity of urine and ascertain its sp. gr. Take about fifteen cc. of it and pour it into the large jar. Then add to the urine in the large cylinder, exactly seven times as much solution of hypochlorite—of ascertained sp. gr.—as there was urine taken. When the two fluids mingle there will be brisk effervescence, and care must be taken that none of the mixture be lost. After several minutes the disengagement of gas is less rapid; and now, by vigorously shaking the jar at short intervals, the process may be hastened, so that at the expiration of an hour the decomposition is complete. It then only remains to take the gravity of the quiescent solution; deduct from what it was before decomposition, and estimate on the basis of 7.791 milligrams per cubic centimeter of urine used for each degree lost; after this manner:

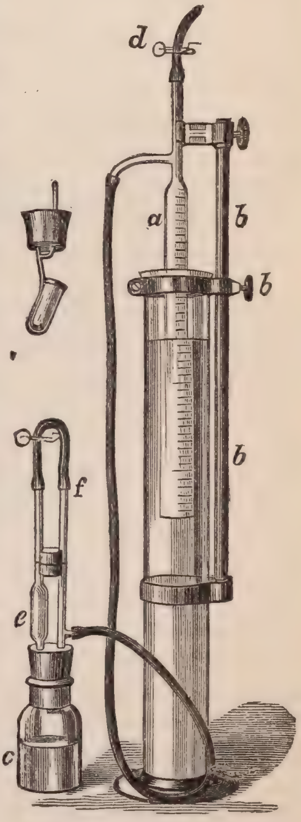
Suppose the sp. gr. of the urine to be 1.020, and that of the hypochlorite 1.045. It is impracticable to take the sp. gr. of the mixture; hence we resort to the law of proportion, and estimate as follows:

1 part at 1.020 = 1.020
7 parts at 1.045 = 7.315
8 8.353
1.041⅞ the sp. gr. of the mixture.

From the gravity of the eight parts of the mixture we subtract that which is obtained after decomposition, which, we will say, is 1.038$\frac{7}{8}$. There is then a loss of 3°, which, multiplied by 7.791, gives 23.373 milligrams of urea per milligram of urine employed. The presence of neither albumen nor sugar interferes with the accuracy of this method. New Rem., July, 1877, p. 202; from N. Y. Med. Jour.

Urea—New Apparatus for its Estimation.—Dr. A. Duprê has constructed a new apparatus (Fig. 88) for estimating urea by means of hypobromite of sodium (made by dissolving 100 grams of caustic soda in 250 cc. of water, and adding 25 cc. of bromine). A burette, *a*, having a lateral supply tube, put upside down into a cylinder of water, constitutes the part for measuring the gas evolved. It can be raised, lowered, and fixed at any height by means of the clamp-rod, *b b*. The reaction between the urine and the hypobromite is effected in a small flask or bottle, fitted up as for the estimation of carbonic acid gas in carbonates. To work the apparatus, the pinchcock, *d*, is taken off, and the burette is let down to the zero point of the scale. Twenty-five cc. of the hypobromite solution are next put into the bottle, and the pipette, *e*, is filled with urine in the usual manner, the india-rubber tube at *f* being detached for this purpose. Before putting the stopper back into the flask, it is advisable to suck up the urine slightly, so that the extreme point of the pipette becomes empty and there is no danger of a drop of urine falling into the hypobromite prematurely. This is best done by compressing the india-rubber tube attached to the pipette between the finger and thumb of one hand, above the pinchcock, and drawing the tube so compressed through

FIG. 88.

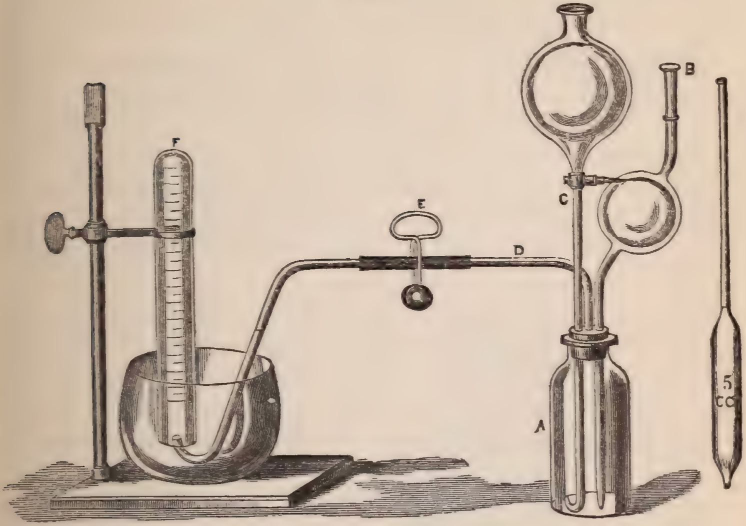


Dupré's Apparatus for Estimating Urea.

the fingers for an inch or so. If now, before relaxing the pressure on the tube, the pinchcock is opened for a moment, the urine will be sucked up to the desired extent. If, previous to use, the point has been slightly greased inside, the urine will show no tendency to run back, and the pipette can be moved without fear. The stopper with the pipette is now to be firmly inserted into the bottle, the india-rubber tube being slipped back over *f*, and the bottle put into a vessel with cold water. The pinchcock, *d*, is to be fixed on, and the burette raised several inches, when, if all is tight, the column of water in the burette will stand stationary. The urine can now be allowed to run into the hypobromite as rapidly as may be convenient, and a thorough mixture effected by a gentle rotary motion of the bottle. According to Hüffner, the reaction is the more complete the more rapidly the two fluids are mixed. In from one to two minutes the reaction will be almost over. The bottle should now be shaken briskly several times. This causes an appreciable amount of effervescence, and is the means of bringing the reaction sharply to the point each time. In five minutes from the beginning of the experiment the bottle is to be put into cold water, the burette let down into the cylinder for a few moments, then raised until the water inside and out is on a level, and the amount of gas collected can then be read off. The small cut, immediately above the mixing bottle, represents a stopper, to which a little test-tube is attached by means of a glass rod, and is intended for a more simple form of bottle for mixing hypobromite and urine, the application of which will be readily understood by those familliar with urea estimations. Working with 5 cc. of urine at the ordinary temperature, 36.7 cc. of the burette indicate 0.1 gram urea.

Another form of apparatus for accomplishing the same purpose has been constructed by Dr. Maxwell Simpson and C. O'Keefe, from materials usually found in every laboratory (see Fig. 89). These are: an ordinary wide-mouthed bottle, *A*, of 1½ oz. capacity; an india-rubber stopper with three holes; a bent pipette, *B*, with its extremity drawn out to a point; a narrow tube, *C*, about 9 inches in length, surmounted by a globe, and furnished with a glass cock, with its extremity also drawn to a fine point and upwards; a narrow gas-delivery tube, *D*, which can be opened and closed at pleasure by means of the pinchcock, *E;* a finger-bowl; and a graduated tube, *F* (Russel and West's scale). To use the apparatus, the bottle is to be filled with a solution of hypobromite of sodium and closed with the india-rubber stopper, through the three holes of which the tubes *B*, *C*, and *D* have already been passed. *C* must also contain water reaching a few lines higher than the glass cock. In closing the bottle care must be observed not to allow any air to be imprisoned between the stopper and the liquid, and that the extremities of *B* and *C* reach to the bottom of the bottle. The end of the delivery tube, *D*, must then be plunged a few lines below the surface of the water in the finger-glass, a little hypobromite solution is to be introduced into the pipette, *B*, and the pinchcock, *E*, opened, by which means all the air is forced out of the delivery tube. The graduated tube, *F*, previously filled with water, is then brought over the extremity of the delivery tube, and the analysis is commenced by introducing 5 cc. of the urine into the globe, *C*, and allowing about one-third of it to pass through the glass cock into the hypobromite solution. According as the gas rises to the top of the bottle, it forces some of the hypobromite into the pipette. When all effervescence has ceased the pinchcock is to be opened, and the gas allowed to pass into the graduated tube. The pinchcock is again closed and one-third more of the urine allowed to flow into the hypobromite, and the gas forced into the graduated tube as before.

FIG. 89.



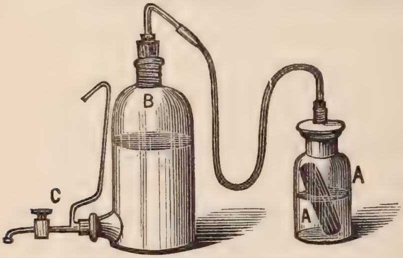
Maxwell and O'Keefe's Apparatus for Estimating Urea.

When the urine has nearly reached the upper surface of the glass cock, a little water is added to it, the stopcock opened, and the whole of the urine washed into the bottle, care being taken not to allow the water to pass below the upper surface of the stopcock. Finally, a little hypobromite is to be introduced into the pipette; if necessary, the pinchcock is once more opened, and all the gas swept into the graduated tube. The graduated tube is then transferred to a deep vessel containing water, the surface of the water inside and outside the tube brought to the same level, and the volume of gas read off.

The authors state that they have found 37.0 to 37.3 cc. (uncorrected) of the graduated tube to correspond to 0.1 gram of urea, differing, therefore, by 0.4 to 0.7 cc. from Dr. Dupré's results. New Rem., Sept. 1877, p. 265–7.

Still another apparatus, in which urea is likewise decomposed by means of an alkaline solution of hypobromite of sodium, is that proposed by Depaire. Fig. 90 represents one form of the apparatus. This consists of a wide-mouthed bottle, *A*, fitted with an accurately ground glass stopper perforated by a glass tube. It is charged with a quantity of hypobromite of sodium solution sufficient to fill the bottle to about one-third of its height. The urine to be examined is introduced into the tube, *A′*, which is of such length that its contents cannot flow out, except by inclining the bottle. The gas is collected in the flask, *B*, which has two tubulures, one above and connected with *A*, the other near the bottom and carrying the tube, *C*, which enters by one end through the cork closing the lower tubulure, is provided with a faucet near the other end, and carries besides, as shown in the cut, an upright branch bent downward at the upper end, and open. When the apparatus is to be used, the bottle, *A*, is charged with

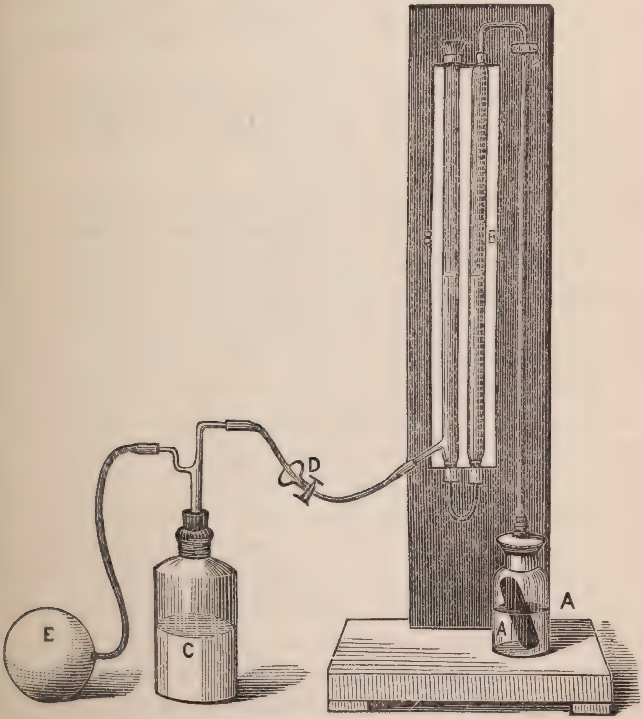
Fig. 90.



Depaire's Apparatus for Estimating Urea.

the hypobromite solution, the tube *A′* containing 10 cc. of urine is carefully placed into it, and the stopper inserted. This causes some water from the flask, *B*, which at the beginning must be nearly full of water, to be discharged from the open end of the upright branch, *C*, after which the level of the water contained both in the tube and flask is made uniform by allowing some water to flow through the faucet. A measuring glass (125 cc.) having been placed under the faucet end of *C*, the contents of the bottle, *A*, and the tube, *A′*, are mixed by gentle agitation, the faucet is opened, and the amount of water which the generated gas has pushed from *B* into the upward branch of C is allowed to run into the measuring glass, until the level of the water in the tube is equal to that in the flask. The number of cc. of water collected in this manner is equal to the number of cc. of nitrogen gas evolved.

FIG. 91.



Depaire's Apparatus for Estimating Urea.

Fig. 91 represents another form of apparatus, in which the same generator, *A*, is employed, but the gas is measured in the graduated tube, *B*. This is an elongated *V*-tube, of which one side, *B*, is graduated into cubic centimeters and tenths, while the other branch is not graduated, but is connected by a lateral tube with a reservoir of water, *C*, into which the excess of water may be allowed to flow from B′, and from which it may be made to run back into *B′* again by compressing the rubber ball, *E*. The reaction having been started as in the first case, the generated gas pushes the water, which at the beginning has stood in *B* at the upper mark, over into *B′*, from which a sufficient quantity is run into the bottle, *C*, to produce an equilibrium of the two columns at the end of the reaction. In either case 38 cc. of gas correspond to 0.1 gram urea. The author also recommends to deduct 4.5 per cent. from the total amount of urea found, to eliminate the error caused by the simultaneous decomposition of uric acid and creatinin. New Rem., Oct. 1877, p. 292; from J. de Ph. d'Anv., 1877.

Rapid methods of estimation, illustrated by appropriate apparatus, are also given by J. Emerson Reynolds, M.D., in Chem. News, April 5th, 1878, p. 135–138.

Urea—Determination in Blood.—The determination of urea in blood, which requires very delicate manipulation, has been simplified by Yvon, as follows: 30 grams of normal blood, or 15 to 20 grams from a patient, are triturated with 4 times the volume of 90 per cent. alcohol, and the coagulated mixture is transferred to a filter. The filtrate should have a greenish tint. If it is reddish, insufficient alcohol has been employed. When the coagulum on the filter has completely drained it is returned to the mortar, mixed with 50 grams of sand, again triturated with alcohol, again transferred to a filter, and washed with alcohol until the washings pass colorless. The alcoholic liquids so obtained are evaporated to the consistence of extract in a beaker, the extract is treated with a little water, whereby fat is separated, the solution is filtered and the filter washed, observing that the total filtrate does not exceed 12 to 15 cc. In this filtrate the urea is determined by the method previously recommended by the author, *i. e.*, by decomposition with bromide of sodium and measuring the volume of nitrogen produced.*

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* The urea is decomposed by solution of bromide into nitrogen, carbonic acid, and hydrobromic acid, according to the following equation:

$$C_2H_4N_2O_2 + 6Br + 2HO = 2N, 2CO_2, 6BBr.$$

The author has determined the urea in normal urine and obtained the same quantity that was obtained by Grehant, *i. e.*, 180 milligrams per liter. The urine of a typhus patient yielded 420 milligrams; that of a person suffering with uræmia even 2 grams. Zeitsch. Œst., Ap. Ver., Dec. 20th, 1877, p. 587.

Urea—Action of Sodic and Calcic Hypochlorites.—The "Jour. de Pharm. et de Chim." (July, 1876), contains an account of a method for the determination of urea, by Jaillard, the peculiarity of which consists in the substitution of hypochlorite of calcium for that of sodium. Yvon has since studied the action of these salts upon urea in order to compare them with that of hypobromite of sodium, and he has found that,

1st. Hypobromite of sodium disengages all the nitrogen from urea in the cold.

2d. Hypochlorite of sodium disengages about 67 per cent. in the cold, and 92 per cent. on heating.

3d. Hypochlorite of calcium disengages about 94.5 per cent. in the cold, but the quantity is not always precisely the same. On heating, more gas is given off than the quantity of urea experimented upon could yield of nitrogen.

The author concludes that in the analysis of urea by decomposition into its elements, hypochlorite of calcium does not give exact results, but that for an approximate analysis it is preferable to hypochlorite of sodium, since the action takes place in the cold and with greater rapidity. J. Chem. Soc., Aug. 1877, p. 226.

Blue Bile.—The presence of blue bile in animals has occasionally been noticed. A. Andonard has recently also noticed such in the matter vomited up by an old lady. It was in sufficient quantity to saturate fine hempen cloths, which were thereby colored sky-blue. Experiments proved the blue color to be due to some organic constituent, and not, as had been suspected, to copper. It was found that the blue coloring matter was readily dissolved by hot water, with difficulty in alcohol, and not at all in ether, chloroform, amylic-alcohol, or petroleum-benzin. The concentrated aqueous solution is handsome blue, with red fluorescence, and has neutral reaction. It is not changed by sulphuric or hydrochloric acid; but nitric acid, when heated, changes the blue to yellow. If the nitric acid contains some nitrous acid, it changes the blue first to violet, then to red, and finally to yellow. Ammonia dissolves the blue color at first unchanged, but it rapidly changes to yellow. Fixed alkalies react like ammonia. Ether, containing some HCl, dissolves the body very slowly, with a yellow color. Zeitsch. Œst., Ap. Ver., No. 1, 1878, p. 8.

Bile Pigments.—W. G. Smith recommends the use of tincture of iodine, already proposed by others, as a reagent for bile in resin. It has this advantage over nitric acid, that it excludes the possibility of confounding bile with indican and that the reaction is more lasting. The reaction is best seen by allowing a few drops of tincture of iodine to flow carefully on the surface of the urine in a test-tube, when a fine green color will be developed at the line of contact, if there are any bile pigments present. The color lasts for some time—occasionally as long as 24 hours. Strongly saturated urine, as it is found in cases of pneumonia, for instance, does not give the reaction. The author has also found that peroxide of hydrogen, or ferric chloride, or a solution of peroxide of lead in acetic or phosphoric acids, produces the same green coloration with bile pigments as tincture of iodine. New Rem., Jan. 1878, p. 8; from Chem. Central. H. (3), 8, 299.

Chlorate of Sodium, according to W. C. Van Biter, may act as a substitute for the bile when this secretion does not enter the duodenum. He considers it most desirable in cases of chronic jaundice, and finds it very useful in certain forms of dyspepsia. New Rem., July, 1877, p. 208.

LOUISVILLE, August 19th, 1878.

REPORTS OF COMMITTEES.

REPORT OF THE COMMITTEE ON THE DRUG MARKET,

FOR THE FISCAL YEAR ENDING JUNE 30TH, 1878.

BY WILLIAM HULL WICKHAM, OF NEW YORK, CHAIRMAN.

THE volume of the drug trade for the year ending June 30th, 1878, was probably as large as the previous year, but complaints in many sections, both from jobbers and retailers, were generally expressed as strong competition, smaller profits, and undiminished expenses. In the centres of trade, especially during the last six months of 1877, prices averaged in favor of the buyer, and large stocks usually resulted disadvantageously to the holders, many of whom, however, have confidence that in some articles at least an upward turn must soon take place.

The failure during the winter of seven houses connected with the drug trade of New York city, was partly caused by the suspension in January of a note-broker, from whom some of these houses had received accommodation, and was partly due to the unprofitable nature of their business transactions of the previous years. The failure of one house was very much felt throughout the United States, especially by owners of proprietary medicines, on account of its extended operations in specialties. The months of January and February were a season of much anxiety and uncertainty to the trade, as the extent of the complications and the number of the firms involved with the bankrupt note-broker were unknown and purposely concealed. Confidence, however, was finally restored, and the credit of several houses which was unnecessarily shaken was more firmly established.

With the exception of a short period, when war between England and Russia seemed imminent, the market was very free from speculation.

The defeat of the Wood Tariff Bill was no disappointment to the trade, as the bill was not generally satisfactory to druggists, because it would have increased the number of dutiable articles in our business, instead of diminishing them, and its provisions would have tended toward complicating rather than simplifying the importation of drugs and chemicals. The possibility of Congress passing the bill by a party vote, caused considerable inquiry for goods which would have been affected, especially such as ginger and other spices, which were ruling in our market at less than cost of importation.

We have reason to congratulate ourselves that we are contributing our mite towards influencing the balance of trade in the direction of the western shores of the Atlantic. Our supplies of the following chemicals were until quite a recent period obtained entirely from England and the Continent, and now, cream of tartar, tartaric, citric, and carbolic acids, Rochelle salts, carbonate of ammonium, bicarb sodium, alum, and several other chemicals, are all largely manufactured here. The borax mines in Nevada supply the entire home demand, to the exclusion of the imported, and in addition we export large quantities of the crude. The quicksilver mines of the Pacific Coast yield sufficient mercury to supply the demands for the arts, sciences, and medicine in this country, while a large surplus is exported to China and Mexico. Immense deposits of sulphur are reported in the Territories, and there has been an effort made by parties interested, to have Congress advance the duties on brimstone, so as to enable this home production to be transported to market, and compete with the Sicilian product, which is brought to our ports as ballast, in holds of vessels containing cargoes of rags and fruit, at consequently extremely low rates of freight.

The following report of your committee refers principally to the New York market. Mr. Meyer, on account of absence in Europe, and Mr. Fuller, from a similar reason, were unable to contribute data in regard to the trade at their respective centres. Annexed will be found an interesting paper from Mr. Baker, of Richmond, in regard to the trade in Virginia.

REPORT FROM T. ROBERTS BAKER, RICHMOND, VIRGINIA.

As a drug market, Richmond does not occupy a conspicuous position in a commercial point of view.

The sales of drugs and medicines in the city of Richmond amounted to $907,300 in the year 1877. But no drugs or medicines have been imported from foreign countries by the Richmond trade during the past year, with the exception of some few casks of cod-liver oil from Newfoundland, which came through a northern port of entry on the score of convenience and economy.

The only drug exported to foreign countries was quercitron bark. Of this, 1605 bags (a bag contains about 800 pounds), valued at $2425, were cleared at the Richmond Custom House, for France; 650 bags, valued at $700, went to Germany, and 1459 bags, valued at $1668, went to England. Besides this outward movement of this bark, a very large quantity of it was shipped coastwise to Baltimore, New York, and other cities. The total value of quercitron bark shipped to foreign countries, through the Richmond Custom House, in 1877, was $4793. Of that shipped coastwise, the amount could not be ascertained, but it is fair to presume that the State of Virginia exports annually not less than five or six thousand tons of quercitron bark.

Sumac is also exported to the amount of five thousand tons per annum.

Senека root, as well as could be ascertained, is exported to the amount of fifteen hundred pounds annually; and of ginseng about the same amount.

Sassafras bark is largely exported from Virginia, but to what amount could not be learned. There is a large amount of sassafras oil manufactured in Virginia, nearly all of which is sent to the large cities North.

Virginia snake-root is also exported in considerable quantities. It is not believed that any other indigenous drugs which have their habitat in this section of country find their way into commerce.

But the difficulty of getting reliable statistics is much enhanced by the fact that the railroad and other transportation companies are in the habit of entering upon their way bills various kinds of indigenous drugs under the one head of barks and roots. There can be no doubt that the undeveloped resources of this section of country in indigenous drugs is immense.

OPIUM.

This article, on account of its high price and almost universal demand, is, commercially, one of the most important drugs to the pharmacist. Its value in market being always well known, and the margin between prices by the case and jobbing quantities being unremunerative, the desire naturally arises to stock at the lowest figures; and speculation, under the excitement of an advance, is more noticeable than in any other drug. In this report, Smyrna opium is always referred to.

July, 1877.—The market opened at $5.25 gold, duty paid. Holders were very unsettled in their views on account of uncertainty of the amount of the crop, and rumors of a possible imposition of an export duty caused an advance to $5.50 gold, duty paid. About the middle of the month, cable advices from Smyrna noted an advance of 15 piastres, which stopped sales for future; but small lots of "spot" were procurable at $5.25 gold, duty paid, at which price the month closed dull.

August, 1877.—Although a little more inquiry was noticeable, during the first week in August prices dropped to $5.00, and parties offered to sell for September and November delivery at $3.75 and $3.87 gold, in bond. Prospects were very indefinite, but the latter part of the month the general impression seemed to be that an advance would take place. Some sales were made at $3.62½ gold, in bond, but stocks becoming more concentrated, the month closed at $3.75 gold, in bond.

September, 1877.—Much activity prevailed during the first week. Sales of 150 cases were effected at $3.70 to $3.87½ gold, in bond, holders asking $4.00, Smyrna quotations being 133 piastres. During the next two weeks the market was quiet and prices steady at $3.87½ gold, in bond, but with more inquiry. During the last week, sales of 100 cases were made at $4.00 gold, in bond, some holders asking $4.12½. No reliable information yet received in regard to the crop.

October, 1877.—The first half of the month evidenced a fair demand at $4.00 and $4.12½ gold, in bond, with inclination on the part of dealers to hold for higher figures. Stocks accumulating, however, induced holders to drop to $3.87½ and $3.75. The month closed, with considerable inquiry and more firmness, at $3.87½ gold, in bond, or $4.87½ gold, duty free.

November, 1877.—Reports of serious damage to the Chinese crop, and consequent purchases in Smyrna to supply deficiency, caused an advance to 138 piastres there, the market in New York being firm, at $4.00 gold, in bond. The price weakened before the close of the month, to $3.87½ gold, in bond, with few transactions, buyers and sellers not agreeing in regard to values.

December, 1877.—Indecision seemed to rule in the opium market during this month; opening at $3.75 gold, in bond, and, notwithstanding this price was generally regarded as very low, the month closed dull at $3.70, gold, in bond—about cost of importation.

January, 1878.—Price nominal, at $3.70, gold, in bond; additional purchases by China caused more firmness, but reports of the crop—7800 cases, afterwards increased to 8500—discouraged demand, and sales were made, to cover advances, as low as $4.50, gold, duty paid. The month closed with firmer feeling among holders, $3.62½, gold, in bond, being ruling price.

February, 1878.—During this month price dropped to $3.50, gold, in bond, and a few single cases were sold at $4.40, gold, duty paid, but towards the close more disposition to hold was evinced, and stocks becoming more concentrated, $3.62½, gold, in bond, was asked.

March, 1878.—The market was quiet but steady at $3.62½, gold, in bond, dropping toward the end of the month to $4.50, gold, duty paid, and this price even was shaded.

April, 1878.—Warlike news coming in during the first week of April, stiffened prices to $3.62½ and $3.75, gold, in bond, $5.10, gold, duty paid, being obtained for small lots, and some holders asked $4.25, gold, in bond. The excitement, however, quickly subsided, and holders wishing to realize, forced prices down to $3.75, gold, in bond. The market was exceedingly dull, rumors regarding damage to the crop having little effect.

May, 1878.—The month opened weak at $3.65, gold, in bond, dropped to $3.50, at which price it closed without much business being transacted. The old story about export duty was again circulated without affecting the views of buyers. It was stated that the treaties which Turkey had made prevented any export duty on opium. Prospects for the new crop were reported as favorable.

June, 1878.—June opened dull at $3.50, and the knowledge that the supply would be sufficient for the demand for over a year, depressed views of holders, so that $3.25, gold, in bond, was quoted. New crop was estimated at 7000 cases, and stocks carried over, 4500 cases, in view of the above reports, the market naturally closed dull and weak, and unless something should happen to reduce the amount of new crop, the opinion seemed general that much higher figures would not be seen until autumn.

Throughout the year the struggle appears to have been to force prices up, because they *seemed* low, in the face of a very large crop and the absence of any considerable speculation.

The table submitted below, was compiled from a report of a large importer of opium. The prices for beginning, middle, and close of each year are in piastres, which were formerly converted into our money by multiplying the piastre price by 3, the result being the price in dollars and cents, gold, in bond; for instance, if the piastre price be 130—130×3 = $3.90 gold, in bond; on account of difference in exchange $2\frac{9}{10}$th is at present employed as the multiple instead of 3. By considering the natural effect of having a crop of 9000 cases, followed by another, which although considerably cut down from earlier figures, at the present writing (July 15th), is still estimated at 5000 cases, the expectation of much higher prices ruling during 1878 cannot reasonably be entertained, unless unusual speculation in a large way should ensue.

ARRIVALS OF OPIUM AT SMYRNA AND CONSTANTINOPLE.

	Price in Piastres.			
Years.	Opening.	Highest.	Lowest.	Total No. Chests.
1870–1871	250	285	130	4500
1871–1872	150	200	130	8500
1872–1873	170	200	170	4400
1873–1874	200	270	165	3150
1874–1875	264	274	130	2430
1875–1876	125	145	122	6300
1876–1877	142	190	137	3250
1877–1878	130	150	120	about 9000

MORPHINE.

July opened with morphine at $4.80, but the price weakened, till at close of month $4.50 would buy from manufacturers' hands, with outside lots offered at slight concessions. During August manufacturers declined their figures to $4.40, afterward dropping to $4.30, outside parties willing to accept $4.20 at the close of the month. September 1st the price was reduced by the chemists to $4.20, which ruled, with more or less firmness, through September, October, and November. In December the market weakened to $4.10. January 1st the price was reduced by the manufacturers to $4.00, and again the same month, to $3.90, at which figure it was steady until March, when a further decline to $3.80

was effected. The 1st of April found morphine in great demand, in sympathy with the spurt in opium; orders were rushed into the manufacturers' hands to such an extent that they only accepted half the quantity, advancing their price on the 5th April to $4.00, without offer, but agreeing to fill full amount of previous applications at $3.80. Small outside sales were made at $4.25, but the demand very quickly subsided and the market became dull at $3.80 toward the end of April, continuing to rule at this figure till the close of June, when the price was reduced to $3.70, with outside lots offering at a considerable reduction, for immediate cash.

The figures which ruled for morphine during the past year, have been largely in excess of the relative value of the article in comparison with opium.

QUININE.

For the reasons mentioned in the last report, quinine, during July and the greater portion of August, ruled at high rates, $4.25 from manufacturers' hands, with more or less firmness from outside holders. The supplies of bark began to accumulate in August, but were held at high prices, and the price of quinine was fairly maintained until the close of August, when the price was reduced by manufacturers to $4.00, followed by further reductions in September to $3.80, $3.60, and $3.40, outside lots offering at still lower figures; these lots, however, were quickly bought up, and $3.40 was maintained with fair demand until December, when $3.20 became the price, followed by $3.00 in January, and $2.90 in February and March, until the demand became so large that the manufacturers in the latter part of March refused to deliver, claiming that stocks of bark were exhausted. On account of the uncertainty in regard to the tariff bill, the manufacturers deemed it better not to advance their prices above $2.90, at the same time they were unable to accept or make contracts.

The market was very much excited, no outside lots being held in speculators' hands and stocks of the wholesale druggists being very meagre. Sales were made at $4.50, $4.75. and $5.00 in small way, some dealers asking $5.50. During the first part of April $5.00 to $5.25 was the jobbing price, gradually weakening as dealers wished to realize at the high prices and manufacturers commenced to relieve the stringency. During May, $3.75 ruled, manufacturers supplying wants, and outside holders shading this price towards the end of the month. In June a reduction to $3.50 took place, at which price the month closed.

Opinions in regard to fall prices vary, some anticipating a lower market before September, others expecting, and not without reason, no change this summer, and a heavy demand in September and October, as a wet June usually causes a large fall demand.

The other alkaloids of cinchona bark have increased largely in use, the largest manufacturers claiming that their sales of sulphate cinchonidia alone are four times the quantity of sulphate quinine.

Carbolic Acid.—Until the past spring we have depended principally upon England and Germany for our supply of *crystal carbolic acid.*

An American firm which has for several years made a specialty of supplying different grades of crude acid, has succeeded in placing upon the market a good article of crystallized acid at a very reasonable price.

The difficulty still to be overcome is to increase the fusible point. There are other American makers, and with improvement in manufacture and decline in prices, the demand for the foreign brands will be greatly diminished.

Citric Acid.—The market dropped gradually to 73 cents, gold, in July; 67 cents in September; 65 cents in October; 64 cents in November, and 62 cents in the early part of December, but recovered to 65 cents on account of advance in London. It ruled steady at 64 cents during January and February, but in March English manufacturers, not wishing to lose their hold on this market, which was almost entirely supplied by the American brand, through the protection of 10 cents per pound duty, sent several consignments to New York, which were offered 5 per cent. lower than corresponding prices in London, and caused a reduction to 62 cents, and in May and June to 60 cents, the American manufacturers meeting the foreign competition; the quality of the latter is fully equal, and by some pronounced superior to the English.

Oxalic Acid has been in ample stock and light demand, on account of the calico printers, who are by far the largest consumers, operating their mills on short time. The price ruled at 9⅞, gold, during July, August, and September, touched 9½ in December, was steady at 9⅜ in January, February, and March, and reached, in the latter part of May, the unprecedentedly low price of 9 cents, which was maintained during June.

Salicylic Acid.—The American manufacturer, under Von Hayden's patent, being unable to prevent importation, strong competition ensued, and consequent decline, prices dropping from $2.50 in July to $1.85 for 100 lb. lots, in May, at which figure it remains steady with good demand.

Powdered Tartaric Acid.—Argols being free, and the duty on the acid being 10 cents per lb., importations of English crystals have entirely ceased, and American manufacturers have been able to supply the demand. In July and August the price in barrels for powdered ruled at 47½, dropping to 43½ in September, and continuing steady at this figure until the scarcity of argols, near the end of June, caused an advance to 46 cents. This advance is believed to be temporary, as last year's wine crop was a good one and argols will be more plenty.

Cream Tartar.—As in the case of *tartaric acid*, the American manufacturers have driven the foreign almost out of market, but the competition between the different American makers has been so strong as to render their prices unremunerative. The price for American crystals in July and August was 27½, gold (French crystals 32¼, gold), declining in September to 25½, in October to 25 cents, and gradually falling during November and December, until, in January, it reached the lowest point of the year, 23½ cents, gold. One lot, a little off color, was sold at a price shading the above. In April, May, and June the market was firm at 24 cents and 24½ cents, manufacturers supplying their contracts made in April. In June contracts were again made by the manufacturers, to fill which, would employ their full stock of argols on hand, and prices at the present writing (July 15th) are firm at 27 cents, gold, with upward tendency.

Carbonate of Ammonium sold in July and August at 13½, gold, advanced to 14 cents, and continued steady at this price for the next seven months, with strong competition between the English and American manufacturers. Prices not affording any profit to makers, a combination was formed in April, and price advanced to 16 cents, being further advanced to 16½ and 17 cents, on account of the American manufacturers having sold up to their capacity, and the greater difficulty of producing in hot weather.

Balsam Copaiba was dull at 37½ to 36 cents in July, August, and September, and gradually weakened to 33 cents in October, and 29 cents in November. In January and February, 28 cents ruled, with considerable sales in the former month, but with the large stocks on hand this price was shaded in March, but recovered at the close of the month, and was held at 29 and 30 cents. Holders asked 33 and 35 cents in May, with sales at the former price, and higher figures were expected, but too many were interested in the article, and prices weakened to 31 cents, and in June closed nominally at 32 cents. Higher quotations are not unlikely to rule, as the stocks are becoming smaller, and will probably be concentrated. During the year our market was lower than in England or Germany, and considerable shipments were exported from New York to London and Bremen. This spring Para merchants have taken advantage of the higher markets abroad and our receipts have consequently been less. Receipts this year were about 75,000 lbs., a little over one-third the amount imported last year; three-quarters of this amount came from Para, one-eighth from Angustura, and one-eighth from Central America.

Balsam Tolu opened in July at $1.25, scarce in August at $1.40, and gradually declined to $1.15 in October, $1.05 in December, 95 cents in January, 85 cents in February.

Supplies coming in freely, the price dropped to 57½ cents in March, the lowest quotation during the year; 70 cents was reached in April, and shipments having been made to Europe, sales were effected in May at $1.00, holders asking $1.15 to $1.25, but the market becoming unsettled prices dropped to $1.00 at the end of May, 90 cents in June, the month closing at 95 cents.

Tonca Beans.—Angustura ruled quite steadily at $1.20 and $1.25, touching $1.15 in December and March, until, the latter part of June, holders demanded $1.40 and $1.50, and expect that $2.00 will be reached, as the crop was small and stocks are light. An advance would have taken place earlier, but the demand was interfered with on account of tobacco manufacturers stopping work.

Vanilla Beans.—The crop now (July, 1878) coming into market is reported as unusually uniform, and, although not a very large yield, the indications are that the quality will be uncommonly good.

Borax.—The decline in this article has been gradual, but uninterrupted during the year, the range being from 9½ to 9¾ in July, to 6¾ to 7¼ in June. It is now refined in San Francisco and New York, and considerable quantities of the concentrated are exported to Europe and there refined; the concentrated, as shipped, containing less water than the refined.

Cantharides.—Russian flies have ranged in price from $1.20 in July, to $1.05 in June, having generally been lower than cost of importation; these low figures are due to the increased consumption of the Chinese flies, which have ruled from 85 cents in July, to 60 cents in June. Supplies of Russian cantharides have been light, and much higher figures would have been experienced had it not been for the substitution of the Chinese.

Ergot.—The decline has been very marked, the highest prices of the year being in July, 1877, 45 to 48 cents, and the lowest in June, 1878, at 22 to 26 cents. The market abroad is reported as dull and neglected.

Chamomiles opened in July at 16 cents and 28 cents for old and new crop of German, and 25 cents and 60 cents for old and new Roman or Belgian. In October, 12 cents and 18 cents for German, and 25 to 35 for Roman were asked. In January and February, 12 cents to 16 cents, and during the balance of the year 12 cents to 15 cents ruled. Best quality Belgian declined to 32 cents in December, 30 cents in January, 28 in February, advanced to 35 cents in March, declining again to 28 cents in April, and closing at 27 cents in June.

The supplies were sufficient for the demand, but no surplus of old crop will be carried over. The dryness of the season will probably cause a light yield for new crop, and higher prices will undoubtedly ensue.

Acacia gum has been very steady and regular.

Tragacanth has also ruled very steady from 60 cents and $1.15 to 60 cents and $1 for flake.

On account of the war, an advance was expected, but the want of demand caused prices to recede below cost of importation.

Camphor.—Price of refined declined to 30 cents about the middle of July, on account of arrivals of crude. In September, supplies being good, refiners reduced their price to 27 cents; in October 26 cents would buy. In December and January the market was steady at 28 cents. In February and March prices fluctuated from 27¾ cents to 27¼ cents. In April, with good demand, sales were made at 27 cents and 27¼ cents, when stocks became quite low, and a considerable shipment of crude being overdue, 29 cents was asked for "spot," during the last week of April and first week of May, while 27 cents would buy to arrive. On account of the arrival of the overdue vessel and a decrease in demand, the price steadily declined, reaching 25¾ cents at end of May, and 24 cents in June, with rather a downward tendency, although a much lower figure is not anticipated.

More parties were engaged in refining, and the consequent competition brought refined lower than the prices of crude would warrant.

Assafœtida opened in June at 16 cents to 18 cents, and gradually declined to 12 cents to 15 cents in December, ruling steadily at these figures till April, when 13 cents to 17 cents were obtained, which were the closing prices in June.

Shellac.—The market opened in July, 1877, at 27 cents for "D.C.," with a range of 26 cents to 19 cents for prime Orange to Native; prices fell off until December, when 22 cents for D.C. was touched, and 17 cents to 20 cents ruled for other qualities. The prices continued firm till June, when 22½ and 23 cents for D.C., and 18 to 21 cents for other brands were demanded, the month closing with market at these figures, and upward tendency.

Although more demand was apparent than was experienced the previous year, the large supplies checked advance.

Prices are believed to be low, and an advance is expected.

Iodide of Potassium was held at $3.20 in July, 1877, sold at $3.10 in August, $2.90 in September, and as low as $2.65 in October, from which it recovered in the same month to $2.90; was firm at $3 during November, advanced to $3.25 in December, at which figure it was steady until April, when on account of the combination between the English and Chilian manufacturers of iodine, the chemists advanced price of iodide to $3.50, and again in May, when a further advance in iodine was made, to $3.75. In June the price was shaded by outside holders, and the month closed at $3.65 and $3.70.

Mercury sold at 47 cents, gold, in July, and advanced to 60 cents in August, but this advance was not maintained, and prices steadily declined to 52½ in October, 51 in November, 50 cents in December and January, 48 to 49 cents in February and March, 47½ to 48 cents in April and May, and 46 to 47 cents in June.

Most of the quicksilver used in this country comes from the Pacific coast, but when the prices in London and San Francisco are equivalent, the lower rates of freight make it an object to import from England. Imports from England during past year, ending June 30th, 1878, were 2500 flasks, only about one-eighth our entire consumption.

Oil of Bergamot has steadily declined from $3.75 to $3.90, gold, at the beginning of the fiscal year, to $2.65 and $2.75 at its close, ruling during the spring months at lower than cost of importation.

Oil of Cassia opened in July, 1877, at 90 cents, gold; in September, some holders asked 95 cents, but lots were still offered at 85 cents; 82 cents would buy in November, 80 cents in December, 79 and 80 cents in January, 77 to 80 cents in February. At the close of March, the price touched 68 cents, but recovered in April, selling at 72 to 75 cents. In May and June, the fluctuations were between 72½ and 75 cents, the month closing at the latter price. Prices were very low, but the market was overstocked, and the demand lighter than usual.

Oil of Anise advanced in July to $1.50, the surplus stock here being exported to Europe. In August, $1.55 was asked, and in September, large transactions were made, and price advanced to $1.70 and $1.75, continuing quite steady till December, when the prices were shaded to $1.67½. During March, holders asked $1.70, but this advance could not be maintained, and a decline to $1.60, gold, took place the latter part of March, and continued through April.

The price stiffened to $1.65 about May 1st, and during the second week in May, a sharp advance to $1.80, took place. In June, holders advanced the price to $1.90, and at the close of June, demanded $2, which price, however, could be shaded.

Oil of Lemon.—This article is another example of a steady, almost uninterrupted decline, opening at $2.75 to $2.90, according to brand, and closing at $2 to $2.50. In the latter part of May and first of June, prices were a little easier; that at the close, from $1.90 to $2.25 being asked.

The demand was light, and the last crop was an average one.

Reports received concerning the prospects for the next crop are very unfavorable, and higher prices are expected. An important cause of the decline in prices of almost all essential oils, and the resulting unsatisfactory nature of this portion of the business during the spring of 1878, was the dissolution of a firm dealing specially in essential oils, and the subsequent formation of two separate houses by its members; the market being demoralized by the strong and reckless competition.

Oil of Peppermint is no exception to the rule of continuous decline, the highest prices being in July, $2.50 for pure can oil, and $3.25 and $3.37½ for bottled brands. In August and September, reports concerning the new crop were favorable, and the market was very much unsettled. From October to February, can oil was quoted at $1.90 to $2, and bottled oil, $2.75 and $2.85, down to $2.50 and $2.60. In March, $1.75 to $2. for can, $2.50 and $2.60 for bottled. During April, May, and June, can oil was quoted at $1.65 and $1.75, and bottled at $2.40 and $2.50.

It is estimated that from September, 1877, to July 1st, 1878, from 3500 to 4000 cases of bottled peppermint oil were exported, and as the exports during July and August are always very inconsiderable, this can be taken as the amount for the year.

Wayne County, New York, continues to be the largest source of supply.

Oil of Sassafras was held at 45 cents in July, 43 cents in August and September.

At the end of November it was firmer at 45 cents, advanced to 48 and 50 cents in December; receded in January to 47 cents; touched 40 cents, but recovered to 43 cents in February; declined to 41 cents in March, 40 to 41 cents in April, 39 to 40 cents in May, and 38 cents in June, with full stocks.

The low prices are induced by want of demand from soap makers and confectioners, the principal consumers.

Oil of Wintergreen.—The market declined from $2.35 in July to $2.10 in November, when considerable purchases were made and holders rapidly advanced prices to $2.50, $2.60 and $2.75.

In December, $2.55 to $2.60 would buy in a small way, holders still expecting a large advance, but the openness of the winter enabled the small distillers to bring the oil to market, and unsettled prices.

In January, it was quoted at $2.50; in February, at $2.25; in March, April, May at $2 to $2.10, and in June $1.90 to $2. The demand for export to Europe is still limited, but the low prices have tended toward increasing this outlet. It has been strongly insisted that the extremely low prices that have ruled during the past year, have absolutely been unremunerative to the producers, but small parcels are continually brought into market at prices considerably below $2, proving that it is extremely difficult to fix the lowest paying price of a product, where labor is not considered as a factor.

Distillers are now paying the gatherers of leaves a much lower figure than formerly.

Oil of Rose opened in July at $8, gold, for Kezanlik, with upward tendency, as the crop was reported a short one.

In August, producers sold out and price ruled firmer.

In September, hostilities were carried into the Balkan Mountains, where the large Rose Gardens are situated, and prices rapidly rose to $9.50, gold, advancing to $10 for best brand, in November and December.

In January, February, and March, $10 to $11, gold, per oz. were asked for best brands, and for the balance of the year $9.50 to $10 ruled. The yield of roses this season is believed to be abundant, but the expenses of distilling will be higher than usual; it is not, however, generally expected that ruling prices will be maintained.

Castor Oil in July, 1877, was held at 13½ cents in cases. In October it declined to 11½ to 12 cents, and in November to 11⅜ to 11½ cents, but recovered to 11¾ and 12 cents, and in December a combination fixed the price at 12½ cents, which outsiders shaded to 12 cents, and prices ruled steadily at 12 and 12¼ during the balance of our fiscal year.

In June, the market closed weaker, the impression being that manufacturers wished to influence sellers of beans, by declining the price of oil. E. I. castor oil is entirely out of market, the small quantity imported being held in bond to fill export orders.

Cod-liver Oil.—Newfoundland oil ruled at $1 to $1.35 according to quality; during July, August, and September, $1 to $1.20; during October and November at 90 to $1.15, until the end of June. The *Norwegian cod-liver oil* ruled quite steadily during the year at about $45 for 30 gallon packages; the great favor with which this oil has been received, has stimulated importation, and the results of the fishery this year having been extremely large, the prices were so favorable that importers during the spring were enabled to lay it down at previous figures, notwithstanding the imposition of a duty of 40 per cent. instead of 20 per cent., in accordance with a recent decision of the government, under plea that it was a medicinal preparation. Some importers paid the duty under protest, and expect that the decision will be reversed.

Ipecac Root has fluctuated considerably. In July $1.30, gold, $1.25 in August, September, and October, $1.32½ to $1.35 during November and December, dropping to $1.20 the latter part of January, and $1.17½ in February; the lowest price, $1.51, was touched in March, but having been controlled, the price was advanced the same month to $1.50, in April to $1.60 and $1.65. In May the market weakened to $1.42½, closing in June at $1.30, with downward tendency.

This article is of such comparatively limited consumption, that a larger or smaller supply than usual easily affects the market.

Canary Seed.—In July, large sales were made at $2, and an advance was expected, as Dutch would have cost 2.37½ to import The month closed with prices firm at $2.12½ and $2.70. The market was quiet in August, prices were regarded as low, but stocks were large and heavy to move.

Large transactions, taking place in Europe during October, induced a firmer feeling in our market, and Smyrna was held at $2, Dutch at $2.10, and Sicily at $2.40. In December, prices dropped to $1.85 to $2.30, in January, $1.60 for Smyrna, $1.75 for Dutch, and $2.25 for Spanish. In February, $1.35 and $1.85 were reached, the lowest quotation of the year.

In March, prices fluctuated between $1.50 and $1.65 for Smyrna, and $2.12½ and $2.25 for Spanish. In April, the market was steady at $1.65 and $2.12½. In May, considerable sales were effected and $1.72 and $1.75 were asked for Smyrna, and about the 1st of June, $1.75 to $2.12½ were the ruling prices; the month, however, closed weaker, as the stocks were too large and in too many hands to be well controlled. The last crops of Spanish and Smyrna were extraordinarily large, while Sicily was very deficient and of poor quality.

Hemp Seed was unusually steady during the year, opening at $1.50 with large stock, occasionally dropping to $1.45 and closing at $1.50. $1.40 was touched during March, when a lot of American was thrown upon the market at $1.30, but the price quickly recovered to $1.50.

Cardamom Seeds opened in July at $1.30 to $1.70. In August an advance in London stiffened prices here to $1.40 to $1.75. In October, Malabars were held at $1.85, and in November advanced to $2, at which price the market continued firm for prime quality, until April, when $2.25 was asked for finest quality, which was the closing price. Madras, being a better stock, did not advance.

Damiana leaf was sold at 25 cents to 40 cents, according to quality and species. There still exists a considerable doubt of the existence of the virtues claimed for it.

Grindelia robusta has increased in demand, and is prescribed with confidence by many practitioners; the demand has caused lower prices, 27 to 35 cents.

Jaborandi has also not been found wanting—therapeutically; the quality in market, for the past few months, has been very poor, price 22 cents. Pilocarpine, muriate, and nitrate have received considerable attention in an experimental way, to the satisfaction of the profession, but the very high cost, 30 to 40 cents per grain, is a serious obstacle to general introduction. Large quantities of Fucus vesiculosus, and probably much sea-weed, which is not Fucus ves., have been consumed in hopes that the adipose tissues of the *patient* might be diminished, and some success has been reported.

Casca or *sassy tree bark*, *boto bark* and *boldo leaf* have only come into market in sample lots, and importers await the decisions of physicians as to their value in medicine and likelihood of demand, before importing larger parcels. *Thymol* or *thymic acid* has been in good demand, which at one time completely exhausted stocks. *Goa powder* and *chrysophanic acid* have been more freely ordered and prices have considerably declined. The results, however, are not fully satisfactory, and the demand is likely to cease.

Respectfully submitted by

W. H. Wickham,

Chairman.

REPORT OF THE COMMITTEE ON LEGISLATION.

THE past like several previous years has witnessed the struggle in several States for the enactment of pharmacy laws; the attempt has again failed, except in the District of Columbia, where by the Senate and House of Representatives of the United States, an "Act to Regulate the Practice of Pharmacy in the District of Columbia," was passed, and approved June 15th, 1878. A copy of this law is appended to this report. Among the commendable features of the law, the following deserve to be mentioned:

(1.) It recognizes diplomas from incorporated colleges of pharmacy, requiring a practical experience in pharmacy of not less than four years before granting the diploma (sect. 7).

(2.) It does not permit the examination for becoming a registered pharmacist unless the candidate, besides being 21 years of age, has had not less than four years' experience in a prescription store (sect. 6).

(3.) It makes the adulteration of drugs a misdemeanor, the penalty being a fine of $100, and the erasure from the register, of the offender's name (sect. 9).

(4.) It provides for certain precautions in the sale of poisonous drugs and medicines, calculated to lessen their improper use through mistakes (sect. 10).

The main objectionable features in this law appear to be the following:

(1.) It does not give even a suggestive voice to the National College of Pharmacy at Washington in the selection of the Commissioners of Pharmacy (sect. 3).

(2.) It requires the appointment of two physicians, besides three pharmacists, to constitute the Commissioners of Pharmacy (sect. 3).

(3.) It permits the examination for registered pharmacist of a graduate in medicine, without requiring of him any previous pharmaceutical experience.

To explain the reasons on which these objections are based, we beg to refer to several former reports, where the reasons were more fully discussed, and merely desire in this place to briefly recapitulate them.

True professional attainments in pharmacy cannot be measured by business success, and are best known to those engaged in the same pursuit. The appointing power, if not professional pharmacists, cannot, therefore, make the best and most proper selections for the pharmacy board, without consulting pharmacists; and if pharmacists are to be consulted, it appears to be by far preferable to vest the right of nominating, if not of appointing, the pharmacy board in a pharmaceutical college or association, which all reputable pharmacists may join, and through which they may have a voice in the appointment of proper persons.

The professional education of physicians is radically different from that of a pharmacist; and a physician as such cannot, therefore, be expected to possess any pharmaceutical knowledge, with the exception perhaps of pharmaceutical incompatibles. Unless fitted by special training, the physician has no knowledge of the physical characters of drugs, or of the manner in which impurities or adulterations are detected, pharmaceutical preparations are made and preserved, or prescriptions are compounded extemporaneously. Physicians, therefore—rare cases excepted—cannot be considered as being competent in examining pharmacists in the most important branches of their calling, with the exception of incompatibles and doses, and a knowledge of these is of greatest service to the pharmacist for the purpose of guarding against errors or mistakes on the part of physicians in the writing of prescriptions. For the same reasons, graduates in medicine without pharmaceutical experience are even less qualified to perform the duties of pharmacists, and this coincides with the experience of all pharmaceutical examining boards who have been questioned on the subject.

The Commissioners of Pharmacy appointed under the above quoted act are: Messrs. W. S. Thompson, Charles Becker, and J. D. O'Donnell, all of whom are members of this Association; and Doctors J. C. Riley and J. G. Morgan. The appointments, we have been informed, are quite satisfactory to the pharmacists of the District of Columbia.

In Pennsylvania, attempts have been made by some unknown parties to repeal the Philadelphia Pharmacy Law of 1872. One of these attempts was made under the guise of a pharmacy law applicable to the entire State, the main feature of which seemed to be to procure an income for some one through the sale of fraudulent diplomas. The attempt was promptly checked through the influence of the newly organized Pennsylvania Pharmaceutical Association.

The following sections from the penal code of California deserves to be recorded in this report, since they refer in part to the adulteration of drugs and medicines, and to the sale of such adulterated articles:

SECTION 382 of the Penal Code: Every person who adulterates or dilutes any article of food, drink, drug, medicine, spirituous or malt liquor or wine, or any article useful in compounding them, with a fraudulent intent, to offer the same or cause or permit it to be offered for sale as unadulterated or undiluted, and every person who fraudulently sells, or keeps or offers for sale the same, as unadulterated or undiluted, is guilty of a misdemeanor.

SECT. 383. Every person who knowingly sells or keeps, or offers for sale, or otherwise disposes of any article of food, drink, drug or medicine, knowing that the same has become tainted, decayed, spoiled, or otherwise unwholesome or unfit to be eaten or drank, with intent to permit the same to be eaten or drank, is guilty of a misdemeanor.

PHARMACY LAW OF THE DISTRICT OF COLUMBIA.

AN ACT *to Regulate the Practice of Pharmacy in the District of Columbia.*

SEC. 1. Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the passage of this act, it shall be unlawful for any person, not a registered pharmacist within the meaning of this act, to conduct any pharmacy or store for the purpose of retailing, compounding, or dispensing medicines or poisons, for medical use, in the District of Columbia, except as hereinafter provided.

SEC. 2. That it shall be unlawful for the proprietor of any store or pharmacy to allow any person, except a registered pharmacist, to compound or dispense the prescriptions of physicians, or to retail or dispense poisons for medical use, except as an aid to, and under the immediate supervision of, a registered pharmacist. Any person violating the provisions of this section shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be liable to a fine of not less than twenty-five dollars nor more than one hundred dollars for each and every such offence.

SEC. 3. That immediately after the passage of this act, and biennially thereafter, or as often as necessary, the Commissioners of the District of Columbia shall appoint three pharmacists and two physicians, all of whom shall have been residents of the District of Columbia for five years and of at least five years' practical experience in their respective professions, who shall be known and styled as Commissioners of Pharmacy for the District of Columbia, who shall serve without compensation, and who shall hold office for two years, and until their successors are appointed and qualified. Said commissioners shall, within thirty days after the notification of their appointment, each take and subscribe to an oath to impartially and faithfully discharge their duties as prescribed by this act. The position of any commissioner who shall fail to so qualify within the time named shall be vacant, and the vacancy or vacancies so occurring, or any vacancy or vacancies that may occur, shall be filled by the Commissioners of the District of Columbia.

Sec. 4. That the Commissioners of Pharmacy shall keep a book of registration open at some convenient place within the City of Washington, of which due notice shall be given through the public press, and shall record therein the name and place of business of every person registered under this act. It shall be the duty of said Commissioners of Pharmacy to register, without examination, as registered pharmacists, all pharmacists and druggists who are engaged in business in the District of Columbia at the passage of this act as owners or principals of stores or pharmacies for selling at retail, compounding, or dispensing drugs, medicines or chemicals for medicinal use, or for compounding and dispensing physicians' prescriptions, and all assistant pharmacists, twenty-one years of age, engaged in said stores or pharmacies in the District of Columbia at the passage of this act, and who have been engaged as such in some store or pharmacy where physicians' prescriptions were compounded and dispensed for not less than five years prior to the passage of this act: *Provided*, *however*, That in case of failure or neglect on the part of any such person or persons to present themselves for registration within sixty days after said public notice, they shall undergo an examination such as is provided for in section five of this act.

Sec. 5. That the said Commissioners of Pharmacy shall, upon application and at such time and place as they may determine, examine each and every person who shall desire to conduct the business of selling at retail, compounding, or dispensing drugs, medicines, or chemicals for medicinal use, or compounding and dispensing physicians' prescriptions within the District of Columbia as pharmacists; and if a majority of said commissioners shall be satisfied that said person is competent and fully qualified to conduct said business of compounding or dispensing drugs, medicines, or chemicals for medicinal use, or to compound and dispense physicians' prescriptions, they shall enter the name of such person as a registered pharmacist in the book provided for in section four of this act.

Sec. 6. That no person shall be entitled to an examination by said Commissioners of Pharmacy for registration as pharmacist unless he present satisfactory evidence of being twenty-one years of age, and having served not less than four years in a store or pharmacy where physicians' prescriptions were compounded and dispensed, or is a graduate of some respectable medical college or university.

Sec. 7. That all graduates in pharmacy having a diploma from an incorporated college or school of pharmacy that requires a practical experience in pharmacy of not less than four years before granting a diploma shall be entitled to have their names registered as pharmacists by said Commissioners of Pharmacy.

Sec. 8. That the Commissioners of Pharmacy shall be entitled to demand and receive from each person whom they register as pharmacists, without examination, the sum of three dollars, and from each person whom they examine the sum of ten dollars. And in case the examination of said person should prove defective and unsatisfactory, and his name not be registered, he shall be permitted to present himself for re-examination within any period not exceeding twelve months next thereafter, and no charge shall be made for such re-examination. The money received under the provisions of this section shall be applied to payment of such expenses as the commissioners may incur in executing the provisions of this act.

SEC. 9. Every registered pharmacist shall be held responsible for the quality of all drugs, chemicals, and medicines he may sell or dispense, with the exception of those sold in the original packages of the manufacturer, and also those known as "patent medicines;" and should he knowingly, intentionally, and fraudulently adulterate, or cause to be adulterated, such drugs, chemicals, or medical preparations, he shall be deemed guilty of a misdemeanor, and, upon conviction thereof, be liable to a penalty not exceeding one hundred dollars, and, in addition thereto, his name shall be stricken from the register.

SEC. 10. It shall be unlawful for any person, from and after the passage of this act, to retail any poisons enumerated in Schedules A and B, as follows, to wit:

SCHEDULE A.

Arsenic and its preparations, corrosive sublimate, white precipitate, red precipitate, biniodide of mercury, cyanide of potassium, hydrocyanic acid, strychnia and all other poisonous vegetable alkaloids, and their salts, essential oil of bitter almonds, opium and its preparations, except paregoric and other preparations of opium containing less than two grains to the ounce.

SCHEDULE B.

Aconite, belladonna, colchicum, conium, nux vomica, henbane, savin, ergot, cotton-root, cantharides, creosote, digitalis, and their pharmaceutical preparations, croton oil, chloroform, chloral hydrate, sulphate of zinc, mineral acids, carbolic acid, and oxalic acid, without distinctly labelling the box, vessel, or paper in which the said poison is contained, and also the outside wrapper or cover, with the name of the article, the word "poison," and the name and place of business of the seller. Nor shall it be lawful for any person to sell or deliver any poisons enumerated in Schedules A and B, unless, upon due inquiry, it be found that the purchaser is aware of its poisonous character, and represents that it is to be used for a legitimate purpose. Nor shall it be lawful for any registered pharmacist to sell any poisons included in Schedule A, without, before delivering the same to the purchaser, causing an entry to be made, in a book kept for that purpose, stating the date of sale, the name and address of the purchaser, the name and quality of the poison sold, the purpose for which it is represented by the purchaser to be required, and the name of the dispenser; such book to be always open for inspection by the proper authorities, and to be preserved for reference for at least five years. The provisions of this section shall not apply to the dispensing of poisons, in not unusual quantities or doses, upon the prescriptions of practitioners of medicine. Nor shall it be lawful for any licensed or registered druggist or pharmacist in the District of Columbia to retail, or sell, or give away any alcoholic liquors or compounds, as a beverage, to be drunk or consumed upon the premises. And any violation of the provisions of this section shall make the owner or principal of said store or pharmacy liable to a fine of not less than twenty-five and not more than one hundred dollars, to be collected in the usual manner.

Sec. 11. Any itinerant vender of any drug, nostrum, ointment, or appliance of any kind, intended for the treatment of diseases or injury, or who shall, by writing, or printing, or any other method, publicly profess to cure or treat diseases, injury, or deformity, by any drug, nostrum, manipulation, or other expedient, shall pay a license of two hundred dollars per annum into the treasury of the District of Columbia, to be collected in the usual way.

Sec. 12. That any person who shall procure or attempt to procure registration for himself or for another under this act, by making or causing to be made any false representation, shall be deemed guilty of a misdemeanor, and shall, upon conviction thereof, be liable to a penalty of not less than twenty-five nor more than one hundred dollars, and the name of the person so fraudulently registered shall be stricken from the register. Any person, not a registered pharmacist as provided for in this act, who shall conduct a store, pharmacy, or place for retailing, compounding, or dispensing drugs, medicines, or chemicals, for medicinal use, or for compounding or dispensing physicians' prescriptions, shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be liable to a penalty of not less than fifty dollars.

Sec. 13. That all fines and penalties under this act shall be collected in the same manner that other fines and penalties are collected in the District of Columbia; and it shall be the duty of the United States District Attorney for the District of Columbia to prosecute all violations of this act.

Sec. 14. That all acts and parts of acts inconsistent with this act be, and the same are hereby repealed.

Approved, June 15, 1878.

The Commissioners of Pharmacy have been appointed as follows:

Pharmacists—W. S. Thompson, Charles Becker, and J. D. O'Donnell.

Physicians—J. C. Riley and J. E. Morgan.

REPORT OF THE COMMITTEE ON THE REVISION OF THE U. S. PHARMACOPŒIA.

To the American Pharmaceutical Association:

Shortly after the adjournment of the twenty-fifth annual meeting of this Association, held last year at Toronto, at which the undersigned received the honor, much against his wish, of being named Chairman of the Committee on the Revision of the U. S. Pharmacopœia, he set about drawing up a plan, according to which he thought the work ought to be carried on. This first plan was submitted to members living in his immediate vicinity, and afterwards to the members of the committee residing at Philadelphia. As a result of these consultations an extended and amended plan was drawn up, which was sent out, as a printed circular, to many members of the pharmaceutical and medical professions for the purpose of inviting criticisms and suggestions. The number of answers received, however, was quite small, and not at all in proportion to the importance of the subject. Shortly afterwards the chairman invited the members of the committee to signify their wishes as to the particular department which they would like to have assigned to them. Some of the members, accordingly, made their own selection, while others left the choice of subjects to the chairman.

On December 28th, 1877, a special meeting of the committee was held at the old rooms of the College of Pharmacy of the City of New York, which was attended by Professors J. M. Maisch and Joseph P. Remington, of Philadelphia; Professor G. F. H. Markoe and S. A. D. Sheppard, of Boston; and Professor P. W. Bedford, Dr. Frederick Hoffmann, and the undersigned of New York. The meeting was likewise attended by several invited guests, prominent among whom was Dr. Edward R. Squibb.

At this meeting the circular issued by the chairman on October 15th, 1877, was fully discussed, and after various amendments, provisionally adopted. In order to enable the members of the Association to express their opinions on the proposed plan, a revised and extended reprint of the first circular is herewith presented. (See below.)

At the same meeting the question of fluid extracts was thoroughly discussed, but no final decision was arrived at. Dr. Edward R. Squibb was requested by the committee to bring forward practical working formulas of the process originally devised and since then followed by him, namely, that of repercolation. This he has done, at a great expense of time and labor, for which the Association at large, and more particularly this committee, owe him their thanks.

Soon after accepting his responsible duties it occurred to the chairman, that it would be useful to have official information as to the intentions of foreign governments in regard to proposed revisions of their Pharmacopœias, and to obtain other data relating to pharmaceutical legislation. The Hon. William M. Evarts, United States Secretary of State, on the application of the undersigned, kindly consented to cause a circular, drawn up for the purpose, to be forwarded to the United States' Ministers and Consuls abroad. The numerous answers received, which required each a separate acknowledgment, were very satisfactory and often very interesting, but supplied little more than was already previously known. This circumstance, together with the fact that some of the replies have not yet been received, induces the undersigned to omit a report on this subject for the present. The thanks of the Association are, however, due to the United States Secretary of State and the diplomatic agents abroad for the interest they have manifested in the affairs of this Association.

The labor of the Revision of the Pharmacopœia naturally divides itself into three distinct portions or departments, namely, Pharmacognosy, Chemistry, and Pharmacy.

The department of *Pharmacognosy*, that is, the description and definition of all crude drugs of vegetable or animal origin, has been accepted by Professor J. M. Maisch, who is assisted by Mr. Charles Mohr. The latter gentleman has already furnished a very complete series of descriptions and diagnoses of the indigenous articles of the Materia Medica, and will continue to furnish others, as called upon.

The department of *Chemistry* has been accepted by Dr. Frederick Hoffmann, of New York, whose work is expected to be finished some time during the coming summer.

In the department of *Pharmacy* it was necessary to make various subdivisions. The most difficult portions of this department are the fluid extracts. The question as to the best process to be selected for their preparation, as well as the proportion which the finished extract should bear to the crude drug, early occupied the attention of the committee, and the whole matter is now in charge of Professor C. Lewis Diehl, whose paper on the subject is well known to the members of the Association. It is to be hoped that many will volunteer their aid and carry on the necessary experiments under his direction. Professor Joseph P. Remington has accepted the work of furnishing formulas for the tinctures, and has already nearly completed his task. Mr. Charles Bullock will furnish formulas for the officinal wines. Professor Emlen Painter has made transcalculations of a large number of formulas into parts by weight, and Professor P. W. Bedford has furnished a similar contribution. Mr. A. S. D. Sheppard has gone over the journals which have appeared since the publication of the last U. S. Pharmacopœia, and has supplied a very extensive set of abstracts of criticisms and suggestions on the formulas contained in that work. Mr. W. H. Crawford has sent a series of general comments on the circular first sent out by the chairman. The latter, besides carrying on the correspondence, has likewise devoted some attention to various portions of the department of pharmacy. A few portions of this department still require to be assigned to special workers. It is confidently believed that there will be no difficulty in finding members who will accept them.

The chairman has received valuable aid, not only from members of the committee, but also from other gentlemen, whom he has asked for assistance. The valuable aid of Dr. Edward R. Squibb in respect to the question of fluid extracts, has already been mentioned; but since then he has devoted further time and attention to the subject and has embodied the results of his experiments in a paper which will be laid before this meeting.

Professor Albert B. Prescott, M.D., has at the solicitation of the undersigned, undertaken to furnish assay-processes for opium and its preparations, for cinchona bark and for strychnia. As a partial result of his labors, the undersigned has the pleasure of presenting to the Association, with the consent of the author, the following papers: 1. Morphiometric Process for Opium, with Commentary. 2. Valuation of Tincture of Opium. 3. Purification of Strychnia from Brucia. 4. Trial of Various Schemes for the Separation and Quantitative Estimation of Quinia, Quinidia, Cinchonia, and Cinchonidia.

The California College of Pharmacy appointed a committee to consider the plan proposed for revising the U. S. Pharmacopœia, and transmitted to the undersigned (through Mr. J. G. Steele), a valuable commentary on old and new preparations. A special committee of two, consisting of Professor W. T. Wenzell and Mr. Tschirner, undertook to work out a table of solubilities, in accordance with the plan, part of which has been received.

The experience acquired during the progress of the work up to the present time has made it evident that the original intention of the Association, as to the scope of the work, becomes, at least in two points, difficult or impossible of execution. The first is the requirement of presenting a *complete* work. Although it will be comparatively easy to finish the main text of the work, a number of determinations of specific gravity, final weight of end product, etc., will have to be left blank, partly because it would be time wasted to determine these in every case, when it is not quite certain whether the final Committee of Revision will adopt the particular formula upon which these figures depend, partly because no member of the Association has sufficient spare time to determine them properly, and finally, because all such determinations ought to be done, if possible, by one and the same person, who should be an expert. The second difficulty is the proposition to submit the complete work to the pharmaceutical and medical professions, which could only be done by printing it; but at whose expense and how this is to be done, is not clear to the mind of the undersigned. A partial solution of the first difficulty consists in finishing the work as far as at all possible, leaving blanks wherever figures are wanting, and submitting those tables which it is impracticable to work out at present, in skeleton form. The second difficulty may be partially overcome by printing selected portions of the most important parts of the manuscript in the Proceedings of the Association.

It is suggested to make a few changes in the committee so as to have every section of the country more fully represented. The president, who is informed of the wants and requirements of the committee, will no doubt make the requisite appointments. At the same time the undersigned chairman is compelled, in consequence of impaired health, to ask the Association to relieve him from the chairmanship of the committee. He is grateful for the honor conferred upon him, as well as for the expressions of encouragement which he has received during the past year; but it should be well borne in mind that all the advance thus far made is primarily due to the able and earnest workers who are members of the committee, or who have assisted the committee in its labors.

Respectfully submitted,

CHARLES RICE,

Chairman of the Committee on the Revision of the U. S. Pharm.

NEW YORK, Nov. 20th, 1878.

THE REVISION OF THE U. S. PHARMACOPŒIA.

GENERAL PRINCIPLES ADOPTED IN THE REVISION OF THE U. S. PH.

1. *Language.*—However strong the arguments may be in favor of using the Latin language in the construction of the official text of a Pharmacopœia, on *this* side of the Atlantic such a proceeding would be, to say the least, impracticable, as the orignal Latin text would be but seldom consulted, and most pharmacists would prefer to use the translation, which naturally would be published, just as most European pharmacists prefer to use Pharmacopœias, written in, or translated into the vernacular.

2. *Alphabetical Arrangement.*—The present division into Materia Medica (primary and secondary list) and preparations is to be abolished, and all articles will be arranged in *one* alphabetical order, retaining, however, such headings as aquæ, infusa, decocta, etc., wherever it will be found useful to give general directions referring to the whole class. For instance, under Infusa the following sentence may appear:

> *Infusions* which are not official, are prepared by pouring 10 parts of boiling water upon 1 part of the drug, allowing to macerate for two hours, straining, and passing enough cold water through the strainer, to obtain 10 parts of infusion.

At the same time all formulæ for the preparation of the single members of such classes shall be made complete in themselves.

The suggestions to follow the plan of some foreign Pharmacopœias, in placing the name of the *part* of a plant in front, so as to make classes of flores, folio, herbæ, radices, etc., has not been adopted. Having so long been accustomed to find *all* the parts of a plant used arranged under *one* head, or at least immediately following each other, the introduction of a new plan would cause inconvenience to many pharmacists.

3. *Remedies to be Discarded.*—While it has been decided to omit

no article at present official, it was resolved to submit a list of remedies which are either not used at all or the usefulness of which may be doubted.

Pharmacists and physicians are requested to express their opinions on the propriety of retaining or abandoning the following articles of the Materia Medica list:

Allium (and Syr. Allii).
Cannabis Americana (and Ext. Cann. Amer.)
Cataria.
Chiretta.
Matricaria.
Monarda (and Ol. Mon.)
Ruta (and Ol. Rutæ).
Salvia (and Inf. Salv.)
Sambucus.
Statice.
Apocynum androsæmifolium.
Aralia nudicaulis and spinosa.
Asarum.
Asclepias incarnata and syriaca.
Carota.
Cornus circinata and sericea.
Cotula.
Diospyros.
Dracontium.
Euonymus.
Euphorbia corollata and Euph. Ipecacuanha.
Gentiana Catesbæi.
Liriodendron.
Panax.
Polygala rubella.
Prinos.
Ranunculus.
Rubia.
Simaruba.
Triosteum.
Viola.
Testa (and Testa præparata).
Canna.
Tapioca.
Sago.
Ovum.

These four articles scarcely need a place in a Pharmacopœia.

4. *Proposed Additions.*—The following is a list of *crude drugs*, *chemicals* and *pharmaceutical preparations*, which are proposed to be added to the new Pharmacopœia. The first list, published in the circular of the undersigned, dated October 15th, 1877, was discussed, and, with various amendments, adopted at a meeting of the committee held in New York on December 28th, 1877. Since then a number of new drugs and preparations have been suggested, from which the undersigned has selected those appearing to deserve consideration. These new suggestions are marked with a star (*), and expressions of opinions, for or against the incorporation of these remedies, are respectfully solicited.

The Latin names given are those proposed to be adopted into the new Pharmacopœia:

Crude Drugs.

Aurantii Folia (*Citrus vulg.*).
Baptisia (*tinct.*).
Balsamum Gurgunicum.*
Calendula (*offic.*).
Coca (*Erythroxylon Coca*).
Corydalis (*formosa*).*
Eriodictyon (*Calif.*).
Eucalyptus (*glob.*).
Frangula (*Rhamnus Fr.*).
Fucus (*vesicul.*).
Galanga (*Alpinia offic.*).
Grindelia (*rob.; squarr.*).
Hamamelis (*Virg.*).
Hydrangea (*arbor.*).
Menispermum (*Can.*).*
Myrcia (*acris.*).*
Paullinia ("*Gurana*").
Pilocarpus ("*Jaborandi*").
Pulsatilla (*Anemone Puls.*).
Pycnanthemum (*linif.*).*
Sumbul (*Ferula Sumbul*).
Thea (*Chin.*).
Thuja (*occid.*).
Triticum (*repens*).
Tussilago (*Farfara*).
Viburnum (*prunif.*).

Catechu has been proposed to either exclusively refer to, or at least include Gambier, which is much better and purer than the ordinary Cutch.

Chelidonium is insisted upon by some of the Southern members, and by physicians in the North (New York, etc.), as a necessary addition to the U. S. Ph.

B. *Chemicals.*

Acidum Chrysophanicum.*
  " Hydrobromicum dilutum.
  " Oleicum purificatum.
  " Salicylicum.
Æther Aceticus.
Ammonii Phosphas.*
Amyl Nitris.
Apomorphia (or its Hydrochlorate).
Aqua Hydrogenii Peroxidi.*
Auri et Sodii Chloridum.
Berberiæ Phosphas.*
Bismuthi Citras.
  " et Ammonii Citras.
  " Tannas.*
Caffeinum.
Calcii Bromidum.
  " Hypophosphis.
  " Iodidum.
  " Sulphuretum.
Camphora Bromata.
Carbonis Sulphuretum* (Carbon Disulphide).
Cinchonia.*
Cinchonidiæ Sulphas.
Codeia.
Coniæ Hydrochloras.
Ferri Benzoas.*
  " Bromidum.*
  " Carbonas Saccharata.
  " Hypophosphis.
  " Iodidum.*
  " Salicylas (?).*
  " Valerianas.
Glycyrrhizinum.*
Hydrargyri Oxidum Nigrum* (solubile).
Lithii Benzoas.*
  " Bromidum.
  " Salicylas.*
Morphiæ Hydrobromas.
Narceia.*
Oxidum Nitrosum (?).*
Oxygenium (?).*
Paraffinum.
Physostigmiæ Sulphas.*
Pilocarpiæ Hydrochloras.*
Piperinum.
Potassii Arsenias.
  " Hypophosphis.
  " Silicas.

Potassii Sulphocarbolas.
Quiniæ Hydrobromas.
  “ Salicylas.
  “ Tannas.
Quinidiæ Sulphas.
Salicinum.
Sodii Arsenias.
  “ Bisulphis.
  “ Bromidum.
  “ Chloras.
  “ Hypophosphis.
  “ Iodidum.

Sodii Salicylas.*
  “ Sulphocarbolas.
Strychniæ Acetas.*
Thymol.
Zinci Bromidum.
  “ Iodidum.
  “ Nitras Fusa.
  “ Phosphidum.
  “ Phosphas.*
  “ Sulphocarbolas.

“Magnesia” is to denote the *heavy* variety.

C. *Pharmaceutical Preparations.*

Acetum Aromaticum.
Argenti Nitras Fusa cum Chlorido.
Chinoidinum.
Collodium Tiglii* (Croton-Oil Collodion).
Dextrinum.
Elixir Cinchonæ.
  “ Cinchonæ et Ferri.
  “ Simplex.
Emplastrum Fuscum.
  “ Ichthyocollæ.
Extractum Belladonnæ Siccum.*
  “ Carnis.
  “ Conii Siccum.*
  “ Digitalis Siccum.*
  “ Ergotæ Aquosum.
  “ Hyoscyami Siccum.*
  “ Jalapæ Alcoholicum.
  “ Malti.
  “ Opii Siccum.*
  “ Rhei Siccum.*
  “ Stramonii Siccum.*
Extractum Apocyni Cannabini Fluidum.*
  “ Aromaticum Fl.*
  “ Aurantii [Corticis] Fl.*
  “ Cannabis Indicæ Fl.*
  “ Capsici Fl.
  “ Castaneæ Fl.
  “ Cimicifugæ Fl.*
  “ Cypripedii Fl.*
  “ Eupatorii Perfoliati Fl.
  “ Hamamelis Fl.*

Extractum Helianthemi Fl.*
  “ Lappæ Fl.*
  “ Leptandræ Fl.*
  “ Paulliniæ Fl.*
  “ Pilocarpi Fl.*
  “ Rumicis Fl.*
  “ Sanguinariæ Fl.
  “ Stillingiæ Fl. Comp.
  “ Sumbul Fl.*
  “ Tritici [Repentis Fl.]
Fel Bovis Purificatum.
Glyceritum Amyli.
Glyceritum Vitelli (Glyconin).
Liquor Bismuthi.*
  “ Chloroformi Compositus (Chlorodine).
  “ Ferri Dialysati.*
  “ Opii Compositus.
  “ Pepsini.*
  “ Potassii Silicatis.
  “ Sodii Silicatis.
Mistura Copaibæ.*
Oleates :—
Oleas Aconitiæ.
  “ Hydrargyri (10 per cent.).
  “ Hydrargyri fortior (25 per ct.)
  “ Morphiæ.
  “ Quiniæ.
  “ Veratriæ.
Oleum Aurantii Corticis.*
  “ Aurantii Florum* (Neroli).
  “ Coriandri.*
  “ Eucalypti.*

Oleum Jasmini Pingue* (Jasmine Pomade, for Cologne).
" Phosphoratum.
" Picis Liquidæ.*
" Santali.
Opium (to be assayed and standardized).
Pepsinum.
Pilulæ Ferri Bromidi.*
Pulvis Antimonialis* (James's Powder).
" Cinchoniæ Compositus* (Tasteless Cinchonia Mixture).
" Glycyrrhizæ Compositus.
" Morphiæ Compositus (Tully's Powder).
Resina Copaibæ.*
" Hydrastis* ("Hydrastin").
" Leptandræ* ("Leptandrin").
" Viburni* ("Virburnin").
Sapo Viridis.*
Spiritus Aurantii* (fr. Ol. Aur. Cort.).
" Jasmini* ("Extract of Jasmine").
" Odoratus ("Cologne").
Syrupus Calcis* (Saccharate of Lime).
" Calcis Lactophosphatis.
" Ferri Bromidi.*
" Ferri Lactophosphatis.
" Ferri Quiniæ et Strychniæ Phosphatum.*
" Hypophosphitum Compositus.
" Manganesii Iodidi.
" Phosphatum Compositus.*
" Sennæ.*
" Stillingiæ Compositus.*
Tinctura Calendulæ.
" Chinoidini.
" Cocci.*
" Croci.*
" Gelsemii (insisted upon by Southern Members).
" Rhei Aromatica.*
" Rhei Dulcis.*
" Thujæ.
" Vanillæ ("Extract of Vanilla").
Unguentum Diachylon (Hebra's).
" Paraffini (substitute for "Vaseline").

Opium Denarcotisatum has been provisionally dropped; but physicians are unanimous as to its great prospective utility, especially if made of standard strength.

5. *Descriptions of Crude Drugs.*—To all crude drugs, concise but complete descriptions are to be added, sufficient to indicate the distinctive characteristics visible to the naked eye; and, when necessary, such as are visible under an ordinary good pocket lens. Common admixtures and sophistications should be mentioned, and the differences pointed out.

The botanical names of plants should be accompanied by the name of the author; and might also be accompanied by the name of the natural family.

6. *Processes for Chemicals.*—Chemicals, except those where differences of process may produce different results, will only be described and defined by concise but complete tests of identity and purity.

Processes are for the present determined on in the following cases only.

It is requested to designate others, where it may be desirable to give the process in full.

Acidum Benzoicum (to be defined as to origin; perhaps with process).
" Hydrobromicum Dilutum.*
" Hydrocyanicum Dilutum (2 per cent.).
" Nitromuriaticum.
" Oleicum Purificatum.*
" Phosphoricum Liquidum (50 per cent.).
" Sulphurosum.
Aconitia.
Antimonii Oxysulphuretum.
Aqua Hydrogenii Peroxidi.*
Argenti Nitras Fusa.
" Nitras Fusa cum Chlorido.*
Arsenici Iodidum.
Berberiæ Phosphas.*
Bismuthi et Ammonii Citras.
Calcii Phosphas ($CaHPO_4$).
Camphora Bromata.
Digitalinum.
Ferri Bromidum.*
Ferri et Ammonii Citras.
" et Ammonii Tartras.
" et Potassii Tartras.
" et Quiniæ Citras.
" et Strychniæ Citras.
" Citras.
" Iodidum.
" Oxidum Hydratum.
" Pyrophosphas.
" Sulphas Exsiccata.
Ferrum Redactum.
Hydrargyri Ammonio-Chloridum.
" Oxidum Flavum.
" Oxidum Nigrum* (soluble).
" Sulphuretum Nigrum.
Potassii Sulphuretum.
Quiniæ Salicylas.*
" Tannas.*
Sulphuris Iodidum.
Sulphur Præcipitatum.
Zinci Phosphidum.

Processes for the preparation of morphia, quinia (cinchonia), and strychnia will be omitted; but to the articles opium, cinchona and nux vomica processes of alkaloidal assay will be added.

7. *Temperature* will be expressed both in degrees of Centigrade and of Fahrenheit.

8. *Chemical Formulas.*—All chemicals of a definite composition will have their formulas added, both according to the new as well as the old notation, together with their atomic weights.

The formulas according to the new nomenclature are to be distinguished by prominent type.

9. *Expressions of Quantity.*—All measures of capacity will be abandoned, and quantities will be expressed only in parts by *weight.* In reconstructing the formulas of the preparations, which are at present officinal, so as to comply with this rule, the following points are to be kept in view:

a. All those tinctures, wines, etc., where a slight variation of dose is of no importance, are to be made as nearly as possible of a uniform strength; that is: 1 part of the crude drug is to be made into 5 parts of tincture, or into 10 parts of tincture, etc., as the case may be. In most of these cases the strength of the new preparations will vary more or less from that of the present Pharmacopœia; but this variation is under the circumstances unavoidable and of no consequence.

b. In the case of very active preparations, as *Tinctura Aconiti Radicis*, *Tinctura Nucis Vomicæ*, *Tinctura Opii*, *Tinctura Veratri Viridis*, etc., the present strength is to be as nearly as possible preserved.

10. *Fluid Extracts.*—The construction of a practical working formula for this important class of preparations is the most difficult part of the new Pharmacopœia. In regard to strength it has been decided that fluid extracts shall represent the drug, *grain* for *grain*.

Not so easy is the decision as to the most practical process to be adopted for their preparation: this question has, even now, not yet been finally settled. The choice lies between two processes, each of which has its advantages and disadvantages; namely, Procter's Process (improved) and the Process of Repercolation (devised by Dr. Squibb). Experiments are at present going on under the direction of Professor C. Lewis Diehl, which will materially assist in solving this question. As it may be presumed that all members of the Association are familiar with the discussions and papers on this subject published during the past year, it is not considered necessary to say any more on this subject here.

11. *Weight of End-product.*—In those formulas (for syrups, ellxirs, etc.), where certain weights of ingredients are directed to be combined under circumstances which may involve a partial loss of any of the ingredients (as for instance, where a variable amount of water may be lost by heat), the weight of the intended end-product should be specified.

12. *Definite Weights.*—Whenever it is necessary to employ definite expressions of weight, as for instance, when it is directed that a certain pill-mass is to be divided into pills of a certain weight each, this weight is to be expressed both in apothecaries' and in decimal weights.

13. *Numerical Relation of Quantities.*—The quantities of the ingredients entering into a compound are to be expressed in the simplest possible terms; and, whenever possible, in a decimal ratio.

14. *Form of Contributions.*—It is requested that all contributions from the members of the committee, and from others, be written *plainly* on *one* side of foolscap paper.

Formulas which are transcalculated into parts by weight, should indicate the different steps by which the old formula has gradually been converted into the new, the last columns giving the simplest, and if possible, decimal terms; also, the percentage composition. Example:

Linimentum Saponis.	Original Formula.	Reduced to exact and uniform weight.	Approximations.— I	or II	Per cent.
Soap, . . .	4 Troy oz.	1,920 grs.	19	10	10.4
Camphor, . .	2 " "	960 "	10	5	5.2
Oil of Rosemary, .	½ fl. oz.	207 "	2	1	1
Water, . . .	6 " "	2,734 "	27	15	15.6
Alcohol, . .	2 pints,	12,176 "	122	65	67.8
				96	100

15. *Tables to be appended to the Pharmacopœia.*

a. Table of Largest Safe Doses of Powerful Remedies.—As it is very often difficult to state what the average adult dose of a given remedy should be, except this statement be accompanied by therapeutical notes, it has been decided to omit the specification of doses in the text.

All dangerous or powerful remedies, however, are to be enumerated alphabetically in a table, giving the largest single and daily doses, which the pharmacist should not exceed, unless the physician adds some distinguishing mark.

b. A Table of Solubilities.—A table of the solubilities of the officinal chemicals in water and in alcohol, at 15.5° C. (= 60° F.), and at their boiling-points.

It would be very useful to have the solubility of these substances determined for various grades of alcohol, namely, that of spec. gr. 0.817 and 0.835; and that represented by most of the tinctures, namely of the spec. gr. 0.941.

c. Alcoholometrical Table.—In view of the necessity of weighing alcohol, etc., for use in the new formulas, a detailed table, giving the relationship between weight and volume of alcohol of various percentages and at various temperatures, is desirable. Such a table has been published by Dr. E. R. Squibb. (See Proceedings Am. Ph. Assoc. 1873, p. 566.)

d. Acidimetrical Tables.—Tables of the spec. gr. and percentage strength of the officinal liquid acids are to be added.

Wherever possible, specific gravities should be given both for 15.5° C. (= 60° F.), and for 25° C. (= 77° F.).

e. Reagents.—A table or list of reagents, for qualitative and quantitative use, in proper dilution. Also a list of the volumetric solutions referred to in the text, with a short account of their use.

f. Synonyms.—It has been suggested to add, either to the headings of each article in the text, or perhaps better, in a table, the most important synonyms of officinal preparations in use.

g. Weight and Volume Table.—To facilitate the introduction of the decimal system in prescribing, as well as for other purposes, a table exhibiting the relationship between the weight and the measure of a given volume of any liquid preparation, is extremely useful. This should contain *all* the officinal liquids in alphabetical order in about the following form:

DECIMAL.			APOTHECARIES	
1000 cc. weigh; (or sp. gr.)	1000 gm. measure.	NAME OF PREPARATION.	1000 min. weigh.	1000 grs. measure.
1047 gm.	955 cc.	Acidum Aceticum, . .	994 grs.	1005 min.
1212 "	825 "	Acidum Lacticum, . .	1151 "	862 "
1160 "	862 "	Acidum Muriaticum, . .	1101 "	907 "
1420 "	754 "	Acidum Nitricum, . . .	1348 "	741 "
1843 "	542 "	Acidum Sulphuricum, .	1749 "	571 "
935 "	1070 "	Acidum Valerianicum, .	887 "	1126 "
750 "	1333 "	Æther, ...	712 "	1403 "
1000 "	**1000** "	**Aqua**, ...	**949** "	**1053** "
835 "	1198 "	Alcohol, ...	793 "	1265 "
818 "	1222 "	Alcohol Amylicum, . .	776 "	1287 "
941 "	1063 "	Alcohol Dilutum, . . .	893 "	1117 "
817 "	1224 "	Alcohol Fortius, . . .	776 "	1288 "
1490 "	671 "	Chloroformum, ...	1414 "	706 "
1250 "	800 "	Glycerina, ...	1187 "	842 "
1355 "	738 "	Liquor Ferri Chloridi, .	1286 "	777 "
1317 "	759 "	Syrupus, ...	1250 "	799 "

The first column at the same time indicates the specific gravities of the liquids (according to the present Pharmacopœia) at 15.5° C. (= 60° F.). An additional column might be added, giving the specific gravities at 25° C. (= 77° F.).

h. A Table comparing the strength of powerful galenical preparations of foreign Pharmacopœias used in this country with those of our own.

i. A table exhibiting the differences in strength of the preparations, as made according to the new and the present U. S. Pharmacopœia.

REPORT ON FLUID EXTRACTS.

BY C. LEWIS DIEHL.

In May of the current year I had the honor to communicate to the Chairman of the Pharmacopœia Committee a "scheme" for co-operative experiments on fluid extracts. This "scheme" appeared to meet with the approval of members of the Association both in and out of the committee, and a number of them signified their intention to make experiments in conformity with it. At the date of this report, however, I have failed to receive reports from the majority of those who had promised their aid, and I have received reports only from five* experimenters, three of whom are not even members of the Association. These reports, together with my own, embrace a list of 41 fluid extracts, 19 of which are reported by me, 8 by Prof. E. Scheffer, 6 by Mr. G. H. Charles Klie, of St. Louis, Mo.; 4 by Mr. Frederick C. Miller, of Louisville, Ky.; 2 by Mr. Edwin W. Joy, of San Francisco, Cal.; and 2 by Mr. W. H. McLaughlin, also of San Francisco. I am indebted to Prof. Emlen Painter, of the California College of Pharmacy, for the co-operation of Messrs. Joy and McLaughlin, and to Mr. William Crawford, of St. Louis, for that of Mr. Klie. Blank tables, furnished by the chairman of the committee, for recording the results of experiments made, have secured concise reports; but the limited time at my disposal has not permitted a very complete analytical comparison of the results obtained, and has been mainly devoted to the construction of comparative tables, showing the bearings which the results may have in various directions. Four such tables, numbered respectively I, II, III, IV, have been prepared and are submitted, together with a copy of the "scheme," and the reports of the individual experimenters.

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* Mr. Charles Mohr, of Mobile, has since informed me that he had a report ready at the meeting, but failing to meet me, he did not offer it to the Association; it is, however, appended to this report.

I presume that the history of fluid extracts is so well understood, that I need not dwell upon it in this connection. That they are almost exclusively an American form of medication, I also take to be accepted beyond dispute; though they appear to be gradually gaining favor in European countries. Being essentially American in their origin and application, we naturally look among the records of American experimenters for information concerning them, and, doing so, we must be struck with the onesidedness of the experiments that have been recorded. Except in a few notable instances, the records simply show: that *A* obtains a clear fluid extract by the use of a particular menstruum or a particular process; or that, by similar measures, *B* obtains a very thick, syrupy preparation; or *C* one that has a specially fine aroma; or *D* a light-colored preparation; *E* one that is dark or *F* one that is very bitter, etc. The more essential factors such as the determination of the nature of the precipitates that give rise to the objection, the determination of the rate of extraction, the relation of the extracted matter obtained by one process to that obtained by another, etc., are generally lost sight of and the average experimenter appears to be satisfied with the brightness, consistence, color, or taste of his product. It is far from my purpose to disparage these physical evidences of quality which, indeed, are great aids to the final determination of the process; but I hold that these are only of value if they have been preceded by a thorough and complete examination of the matter held in solution, as well as that which the menstruum employed has failed to dissolve, in all instances in which a reasonable doubt as to the value of the menstruum exists; and these points having been determined to our satisfaction, we are prepared to investigate whether permanent brightness, a thick consistence, a lighter or deeper color, are essential factors. For it may be that the menstruum is too strong for useful medicinal exhibition, in which event, if a weaker menstruum, and one that is suitable for the final purposes of the fluid extract, is capable of dissolving and holding in solution all that is active in the drug, who will be willing to sacrifice its medicinal utility for the sake of brightness? or, if the menstruum is too weak for the ultimate application of the preparation, who will object to a lighter color, if we can by the use of a stronger menstruum make it available for a greater variety of purposes?

These were among the reflections that obtained in my mind when the subject of fluid extracts was first suggested to me as a task in connection with the revision of the Pharmacopœia, and it was with a view to inaugurating a systematic method of experiment and examination that I proposed the "scheme" above referred to. It is true, that the experiments required by the "scheme" are of the simplest character, and are not calculated, in themselves, to give a final solution of the problem. But they particularly reach some important objections that have been made to the present formulas for fluid extracts, and they very clearly point out the probable relation of their volumes to weight, and the difficulties that will be encountered if it should be decided to adopt weight measures to the exclusion of measures of volume. It is not my purpose to criticize or defend the formulas of the Pharmacopœia; but I cannot help thinking that much that has been said against the fluid extracts—taken as a whole—is neither justice to the work or to its authors. The formulas present three important factors: 1, simplicity; 2, economy in menstruum; 3, application of heat to but a small proportion of the extracted matter. Unfortunately, in some instances, either by the selection of the menstruum, or the preservative, or by failing to carry the extraction to the proper limit, the processes have proved defective, and discredit has, as a consequence, been cast on all of them. Now one of the prominent faults of the present processes, is the failure to direct the exhaustion of the drug. In the instances of the great majority of the fluid extracts, the directions of the general formula (p. 151 U. S. Pharm.) are designated as the limit of exhaustion: *i. e.*, 24 fluid ounces of percolate are directed to be obtained from 16 troy ounces of the drug, of which the first 14 fluid ounces are to be set aside, and the subsequent 10 fluid ounces evaporated, etc. I am afraid that in these directions practical exhaustion of the drug has been sacrificed to economy in menstruum; for while in the instances of some easily extracted drugs, practical exhaustion may be secured within the limits of the pharmacopœial quantities of percolate, in the great majority of cases this appears to be impossible. Another very serious fault is to be found in the employment of two distinctly constituted menstrua in most of the formulas. Thus, for example, fluid extract of colombo* is directed to be made by first percolating with a mixture of 14 fluid ounces of alcohol and 2 fluid ounces of glycerin, and then with a mixture of 2 parts of alcohol and one part of water. If the operation has been successfully conducted, the first 14 fluid ounces will be composed exclusively of first menstruum and extracted matter, while the second portion of percolate—10 fluid ounces—will be composed of the remainder of the first menstruum, of a certain portion of the second menstruum, and of extracted matter, differing, in all probability, from that held in solution by the first menstruum. When this second percolate has been evaporated to 2 fluid ounces, it is still further changed: the alcohol has all been driven off, and we now have a mixture of extracted matter, the glycerin from the remaining portion of first menstruum, and water. The latter will be greater or less according to the quantity of extracted matter, and just in proportion to its quantity it will dilute the main and more important solvent, and must, of necessity, affect its power to hold the extracted matter in solution. We have then in the instance of this process, two factors that are likely to affect the permanence of the final product: 1, variation in the composition of the menstrua employed, whereby extracted matter obtained under different conditions are introduced into the preparation; and 2, the introduction of water by the addition of the evaporated portion of percolate. This latter factor is an objection to all of the formulas, with the exception of those in which alcohol alone is used as menstruum.

Another important factor in the processes for fluid extracts is heat. There is no doubt that the small quantity of percolate demanded in the officinal processes is as largely due to the fear of too long exposure to heat, as it is to motives of economy. This fear of diminishing the effectiveness of fluid extracts by heat, however slight, crops out in almost all the papers that have been written upon the subject in recent years, and it becomes, therefore, a proper inquiry whether this fear is justified by facts, or even by probabilities. As far as the testimony of facts is concerned, this can only be obtained by future experiments. I do not think it has yet been proved by actual experiment that the moderate heating necessary to concentrate the final portions of percolate, materially affects the quality of the fluid extract if a proper proportion of the first percolate has been set aside and not heated. The probabilities, however, are preponderatingly in favor of the view, that the heat necessary to the preparation of fluid extracts, does not materially affect the quality of the product. By referring to the tables, it will be found that when simple percolation is resorted to, the first 12 fluid ounces of percolate from 16 troy ounces of the drug contain in the neighborhood of 60 per cent. of the total matter extracted. In the great majority of the experiments recorded, this percentage is above 60 per cent.; it is below 50 per cent. only in one instance—cotton-root bark (49.10 per cent.); it is below 60 per cent. only in six instances—the one named, that of gelsemium (51.82 per cent.), of belladonna root (57.52 per cent.), of rhubarb (58.90 per cent.), of yerba santa (59.10 per cent.), and of gentian (59.82 per cent. In six fluid extracts it is between 60 and 65 per cent., in eight between 65 and 70 per cent., in two between 70 and 75 per cent., in one between 75 and 80 per cent., and in two between 80 and 85 per cent., both of the latter being dandelion: the one 80.29 per cent., the other 83.75 per cent. With these results it is safe to take 60 per cent. as the average proportion of the total extracted matter that is not subjected to heat at all, while the remainder—40 per cent.—will require the application of more or less heat. Now when we consider that in the preparation of solid extracts, syrups, and many other galenical preparations of the Pharmacopœia, much greater and more prolonged heat is often necessary, and that these preparations have been found by experience to be medicinally very effective, and in many cases accurate representatives of the drugs from which they are prepared, it is not reasonable to conclude that the moderate heating necessary to concentrate the dilute percolates will materially affect the final product. It is true that in some instances even the moderate heating required during this final concentration has an unfavorable effect upon the matters subjected to its influence; but these instances are few, the change cannot be very great, and it affects, moreover, only a comparatively small proportion of the extracted matter.

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* Fluid extract of colombo is selected to illustrate the idea to be conveyed, and not because the formula is known to give unsatisfactory results.

It appears, then, that upon the basis of the general law, "that vegetable solutions are *liable* to alteration when heated," the application of heat to any portion of the fluid extract has been proscribed by experimenters, without pausing to inquire into facts, established either by themselves or recorded by others. And what has been the practical effect of this outcry against the application of heat? It has given us the faulty formulas of the present Pharmacopœia, and, what is worse, it has given the manufacturers the cue to the direction in which they can best advertise their products: the one claiming the advantage of the vacuum, another of no heat at all, and a third finds salvation only in the use of the green drug; and, indeed, if it were not for the physical impossibility of the achievement, we might in the early future hear of the superior advantages of sugar- and gelatin-coated fluid extracts.

I have been led to make these remarks, not so much as a sequence to the results that have been obtained in the experiments under consideration—for these are as yet incomplete—but because I am convinced that the subject of fluid extracts demands and merits the attention of every member of the committee. If it is conceded that the labors connected with the revision of the formulas for fluid extracts must be divided among a number of experimenters, it will also be conceded that these experimenters must work according to a uniform and clearly defined plan, if we expect useful and concordant results. The "scheme" for co-operative experiments was proposed by me with a view to arriving at some such plan. I am of the opinion that if a sufficient number of experimenters can be induced to work according to the "scheme"—a certain class of fluid extracts being apportioned to each—the results cannot fail to point out the proper formulas for adoption in the Pharmacopœia. But, unless some such plan—be it a modification or entirely distinct from the "scheme"—is adopted, I fear that very little will be gained by individual experiments.

SCHEME FOR CO-OPERATIVE EXPERIMENTS ON FLUID EXTRACTS.

I. THE EXTRACTION OF THE DRUG.

A. Simple Percolation.—16 troy ounces of the properly powdered drug are moistened with sufficient menstruum to cause the powder to cake together into an adhering mass when pressed in the hand, and yet to permit it to be passed through a coarse sieve (No. 18 or No. 20); the whole of the moistened and sifted material is then placed in a glass percolator, the orifice of which is stopped with raw cotton, well shaken down, and when shaken down as uniformly as possible, it is pressed evenly and firmly. A disk of filtering-paper is placed on the surface, a flat (mushroom-shaped) stopper is placed on the centre of the paper disc, and the menstruum is poured on through a funnel nearly touching the stopper. As soon as the percolate begins to permeate the cotton stopper, the orifice is securely closed by a cork, allowed to remain so for 24 to 36 hours, and then the following percolates are separately obtained:

12 fluid ounces, which is marked No. 1 (reserve).
12 “ “ “ “ 2
12 “ “ “ “ 3
12 “ “ “ “ 4

Then the residue is expressed, the liquid filtered, and marked No. 5.

B. Fractional Percolation.—*a.* 8 troy ounces of the drug are packed into the percolator precisely as in *A;* after standing 24 to 36 hours, the following percolates are separately obtained:

4 fluid ounces, which is marked No. 1*a* (reserve).
4 “ “ “ “ 2*a*
4 “ “ “ “ 3*a*
4 “ “ “ “ 4*a*
4 “ “ “ “ 5*a*
4 “ “ “ “ 6*a*

Then the residue is expressed, the liquid filtered, and marked No. 7*a*.

b. 8 troy ounces of the same drug are treated as under *a*, using for the moistening of the powder and the subsequent percolation, successively the percolates Nos. 2*a*, 3*a*, 4*a*, 5*a*, 6*a*, and the expressed portion No. 7*a*, followed by sufficient of the original menstruum to secure the following percolates:

4 fluid ounces, which is marked No. 1*b* (reserve).
4 “ “ “ “ 2*b*
4 “ “ “ “ 3*b*
4 “ “ “ “ 4*b*
4 “ ‘ “ “ 5*b*
4 “ “ “ “ 6*b*

Then the residue is expressed, the liquid filtered, and marked No. 7*b*.

II. THE DETERMINATION OF THE EXTRACTED MATTER.

2 cc. of each of the percolates and expressed liquids obtained by either of the processes given under I are carefully measured into a capsule (or a watch-glass), and evaporated on a water-bath to complete dryness, or until it no longer loses weight. The capsule—with contents—is then balanced on a delicate balance, the contents are removed by washing, it is dried, heated for a short time on a water-bath, replaced on the scale-pan, and the equilibrium of the balance is restored by accurate weights; the sum of the latter gives the weight of the "extracted matter" contained in 2 cc. of the particular percolate under examination, which sum, when multiplied

by	14.76	gives quantity	contained in	1	fluid	ounce.
"	29.52	"	"	2	"	"
"	59.05	"	"	4	"	"
"	118.125	"	"	8	"	"
"	177.20	"	"	12	"	"
"	236.25	"	"	16	"	"

It will be observed that, in carrying out the determinations of the "extracted matter" according to the above directions, any essential oil or other volatile component present is sacrificed, and not represented in the result. This would be a radical error if the determination were intended to ascertain the quality of the drug used, but is of no consequence in these experiments, for the following reasons:

(1.) The determinations of extracted matter are mainly intended to determine the degree of completeness with which the drug is represented in the consecutive portions of percolate obtained.

(2.) The volatile components of vegetable drugs are usually dissolved with greater facility than their non-volatile components, and are therefore, in all possibility, represented practically in the reserved portions of the percolates.

(3.) Before the final determination of the formula, controlling experiments must be made in all cases that admit of reasonable doubt.

Some drugs yield such large quantities of "extracted matter" that, even with the small quantities of percolate (2 cc.) subjected to evaporation, it is difficult to evaporate to complete dryness at a moderate heat, unless it be very much prolonged. Moreover, the first portions of percolates are, as a rule, much denser than the following portions, so that the last portions are dry long before the first. It is, therefore, advisable to reduce the 2 cc. of the first (and, under circumstances, also the second) percolate to 16 cc., and to evaporate 2 cc. of this mixture along with the other percolates; by multiplying the ascertained weight by 8, the weight of "extracted matter" in 2 cc. of the original percolate is obtained.

Furthermore, the evaporation of a single set of percolates should be conducted at one and the same time and under identical conditions. In the absence of a regular water-oven, a tin vessel containing water and covered with a tin plate, upon which the capsules—or watch-glasses—are placed, will answer admirably.

III. APPLICATION OF THE DETERMINATIONS MADE.

The old processes for making fluid extracts suffer from the fact that no provision is made for restoring the alcoholic strength of the "evaporated portion" to its normal condition, in those cases in which either diluted alcohol or a mixture of alcohol and water are directed. When hydroalcoholic solutions are evaporated, the evaporation of alcohol and water is unequal, and water alone remains after a time with the dissolved matter. This, in its bearings on the old processes for fluid extracts, is a radical fault, and one that is often the cause of the precipitation observed in these preparations—whether of active matter or not is no part of the present inquiry. The absolutely accurate restoration of the solvent to its normal condition is practically impossible, but it is possible to approximate to it very nearly, by the aid of the determination of "extracted matter" made.

A. Application to Process of Simple Percolation.—The amount of "extracted matter" in percolates Nos. 2, 3, 4, and the expressed portion No. 5 being determined, its volume is approximately calculated, by allowing *one minim* for each *one grain* found. The calculated volume is then deducted from 4 fluid ounces—the volume to which the percolates are to be brought before addition to the reserved portion (No. 1). The volume of water required to restore the remaining portion of the 4 fluid ounces, with the addition of alcohol U. S. P., to its original strength, is next ascertained, and the united percolates are then evaporated to this volume, plus the calculated volume of "extracted matter;" finally, alcohol U. S. P. is added to make the liquid measure 4 fluid ounces.

Suppose, for example, that the united weight of "extracted matter" in the portions 2, 3, 4, and 5 is 240 grains, and that the menstruum used is diluted alcohol, 240 minims = *one-half* fluid ounce, would then be deducted from *four* fluid ounces, leaving *three and one-half* fluid ounces to be restored to the original strength of the diluted alcohol; one-half of this (approximately) is water; consequently, the united percolates have to be evaporated to $1\frac{3}{4} + \frac{1}{2} = 2\frac{1}{4}$ fluid ounces, and brought to the measure of *four* fluid ounces by the addition of *one and three-fourths* fluid ounces of alcohol U. S. P.

B. Application to the Process of Fractional Percolation.—This is, of course, the same as to the process of "simple percolation;" the united weight of "extracted matter" in the percolate No. 3*b*, 4*b*, 5*b*, 6*b*, and the expressed portion 7*b*, being ascertained in the same way, and, when brought to the proper condition and volume, added to the previously mixed reserved portions (Nos. 1*a*, 1*b*, and 2*b*).

C. General Application.—The determinations of the "extracted matter" permit of varied application in connection with the final solution of the fluid extract "problem."

a. An insight is gained into the facility—be it greater or less—with which the drug is extracted by the particular menstruum employed.

It is true that the quality of "extracted matter" yielded is not absolutely a criterion of the degree in which the drug is being exhausted of its active constituent; but it nevertheless affords a good basis for judgment, while any doubt as to the practical exhaustion of the drug may be settled by appropriate examinations of the reserved portions of the original and of the percolated drug.

b. The united quantity of "extracted matter" determined in all of the percolates from the drug, gives the quantity that should be contained in the finished fluid extract.

In the process of extraction by "simple percolation," percolate No. 1 is reserved; the others being concentrated and added to the reserved portion. Simple addition of the total quantities of "extracted matter" in each portion is, therefore, all that is necessary. In the second process of extraction, however, that of "fractional percolation," two distinct sets of percolates are obtained: percolates Nos. 1*a*, 1*b*, and 2*b* being reserved, and constituting with percolates 3*b*, 4*b*, 5*b*, 6*b*, and the expressed portion 7*b*, the set that corresponds to that of "simple percolation;" whilst 2*a*, 3*a*, 4*a*, 5*a*, 6*a*, and 7*a* are consumed in the percolation of the second portion of the same drug. The determination of the extracted matter in these portions, however, is important, since it determines in how far these percolates are capable of extracting a fresh quantity of drug. Thus, percolate No. 2*a* is contained in No. 1*b*, which should therefore contain as much "extracted matter" as Nos. 1*a* and 2*a* together, if the extraction has been perfect; No. 2*b* as much as 2*a* and 3*a*; No. 3*b* as much as Nos. 3*a* and 4*a*, etc.

c. The fractional determinations of the "extracted matter" furnishes admirable data upon which to base the period beyond which it is wasteful or inexpedient to continue the percolation; it also affords valuable data for general reference.

IV. METHODS OF CONTROL.

The numerous weighings necessary in determining the quantities of "extracted matter" in the fractions of percolate make it probable that some errors would creep in, in rendering the total quantities. To control this, a portion of the finished fluid extract is diluted to 8 times its volume with sufficient of the original menstruum, and the "extracted matter" in 2 cc. of this diluted fluid extract is determined as in the cases before mentioned.

It is important also that the practically complete exhaustion of the drug be verified. To do this by continuing the percolation beyond a certain point, is, to say the least, wasteful; to exhaust a separate portion by percolation entails an amount of extra trouble, which should, if possible be avoided. The simplest method, and one which should answer every purpose, consists in preparing a tincture by the old-time method of maceration: 60 grains of the powdered drug being macerated in 1 fluid ounce of the menstruum, with frequent agitation for two weeks; after which it is allowed to settle clear, and the "extracted matter" is determined as in the case of the fluid extract.

For further purposes of control, it is necessary that each experimenter reserve the following:

(1.) A portion of the powder from which the fluid extract is made.

(2.) A portion of the powder which has been subjected to percolation by one of the processes named. In case "fractional percolation" has been resorted to, it is necessary to reserve a portion of each fraction.

(3.) A portion of the finished fluid extract, the specific gravity of which should be determined.

(4.) The tincture (prepared as above mentioned, by maceration), without removing the dregs.

V. GENERAL RULES.

To secure practical co-operation, it is necessary that the experiment shall be made under as nearly identical condition as is possible. To this end, the following rules should be observed:

(1.) *The Condition of the Drug.*—The drug should be a good commercial specimen, free from all extraneous matters, and carefully garbled if it occurs associated with parts of plants, etc., not strictly belonging to it.

It should be—air-dry—reduced to a uniform powder, by passing it through a sieve of at least 40 meshes to the linear inch, and may, under circumstances, but need not, exceed a fineness of 60 meshes. The quantity powdered should be in excess of that required for the fluid extract.

(2.) *The Weights and Measures.*—The accuracy of the weights and measures should be verified.

I have graduated for my own use several sets of bottles, varying in total capacity from 4 to 16 fluid ounces, and graduated in progressive quantities of 1, 2, 3, and 4 fluid ounces (selecting tall, narrow, and regular-shaped bottles), to suit greater or lesser quantities of fluid extract. The weight of a fluid ounce of distilled water, at 60° F., is that adopted by Dr. Pile, viz.: 455.669 grains.

(3.) *The Menstrua.*—The selection of the menstruum for each fluid extract must, of necessity, be left to each experimenter. Glycerin as a solvent, and the addition of sugar to the fluid extract, should be avoided, unless their presence is absolutely necessary, in which event, however, the above experiments cannot be made with the particular fluid extract. In selecting the menstruum, the experimenter will of course be guided by his knowledge and experience. Where these fail him, and there appears to be necessity for a change in the alcoholic strength of the present preparation, the papers published from time to time in the Proceedings of the Am. Pharm. Association (vols. x, p. 76; xi, pp. 64, 222; xii, p. 81, 286; xiii, p. 106; xv, p. 155; xvi, p. 157; xvii, p. 146, and numerous others), and among these notably the essay of the late Prof. William Procter, Jr. (xi, p. 222), will afford material aid in such determination.

Under all circumstances the whole quantity of menstruum required for the fluid extract should be prepared at once, and its specific gravity should be carefully determined and recorded.

(4.) *The Percolation.*—The quantity of menstruum required for moistening the powdered drugs, preparatory to packing them in the percolator, is so variable that no definite quantity can be specified. The powder should be moistened to such a degree that, when it is pressed between the hands, it will form an adhering but friable lump. To secure an equal distribution of the moisture, it should be passed through a coarse sieve (No. 18 or No. 20) on a sheet of stiff paper, from which the whole quantity is then at once poured into the percolator. After thoroughly shaking down the powder, which is best done by thumping the percolator on a hard surface, it is pressed evenly and firmly with the hand or a pestle; the degree of pressure being regulated by the nature of the drug, although, as a rule, it can be quite strong. When operating with 16 troy ounces of the drug, the percolate should not pass faster than 60 drops a minute, and in the event that the packing has not been firm enough, should be regulated by the aid of a cork.

(5.) *The Record of Experiments and Results.*—This should be presented at the next meeting of the Association, together with the "reserved portions" mentioned under V (methods of control), and such remarks as may be deemed appropriate or necessary. The keeping of the "record" will be greatly facilitated if a tabulated form is adopted.

TABLE I.

NUMBER.	FLUID EXTRACT.	QUANTITY of Extracted Matter obtained by maceration.	QUANTITY of Extracted Matter in the finished Fluid Extract.	PERCENTAGE of Extracted Matter in Fluid Extract exposed to heat.	PERCENTAGE of Extracted Matter in Fluid Extract not exposed to heat.	RELATION of the Extracted Matter in the Tincture to that in a corresponding quantity of Fluid Extract.		PROCESS.	EXPERIMENTER.
		Per Cent.	Per Cent.			Tincture.	Fluid Extract.		
1	Eucalyptus	25.37	25.37	37.50	62.50	1000	1000	Simple	Diehl
2	Guarana	21.50	20.76	30.84	69.16	“	964	“	“
3	Ergot	12.77	12.02	11.97	88.03	“	931	Fractional.	“
4	Gentian	35.26	34.60	40.18	59.82	“	978	Simple	“
5	Ipecac	10.00	* 7.69 9.52	100.00	....	“	* 769 952	“	“
6	Cubeb	8.46	8.45	28.46	71.54	“	1000	“	“
7	Gelsemium	6.14	5.37	48.18	51.82	“	875	“	“
8	Aconite-root	16.32	16.05	35.53	64.47	“	983	“	“
9	Lupulin	61.51	65.13	35.30	64.70	“	1058	“	“
10	Dandelion	20.85	21.26	19.71	80.29	“	1018	“	“
11	Cotton-root bark.	15.44	15.09	50.90	49.10	“	969	“	“
12	Belladonna-root	15.44	17.41	42.48	57.52	“	1117	“	“
13	Liquorice	30.07	29.24	28.80	71.20	“	972	Fractional.	“
14	Hydrastis	23.16	23.16	20.91	79.09	“	1000	“	“
15	Coto-bark	26.21	25.44	11.20	88.80	“	970	“	“
16	Aconite-leaves	20.88	20.88	25.31	74.69	“	1000	“	“
17	Eucalyptus	25.37	26.21	24.68	75.32	“	1033	“	“
18	Lobelia	22.42	21.65	34.39	65.61	“	966	Simple	“
19	Cinchona	21.27	21.27	12.86	87.14	“	1000	Fractional.	“
20	Jaborandi	16.18	16.60	33.89	66.11	“	1029	Simple	Scheffer
21	Senna	24.60	29.89	32 05	67.95	“	1215	“	“
22	Hydrastis	21.23	21.31	35.52	64.48	“	1003	“	“
23	Dandelion	26.58	29.89	33.57	66.43	“	1125	“	“
24	Dandelion	26.58	28.90	25.00	75.00	“	1087	Fractional.	“
25	Cimicifuga	17.08	17.25	38.18	61.82	“	1009	Simple	“
26	Capsicum	22.27	21.92	17.31	82.69	“	984	Fractional.	“
27	Liquorice	29.61	29.67	36.34	63.66	“	1002	Simple	“
28	Senna	27.71	24.11	33.20	66.80	“	870	“	Miller
29	Senna	27.71	24.49	27.03	72.97	“	883	Fractional.	“
30	Ergot	12.91	12.61	23.80	76.20	“	976	Simple	“
31	Ergot	12.91	12.33	13.33	86.67	“	955	Fractional.	“
32	Aconite-root	9.53	9.22	29.34	70.66	“	969	Simple	Joy
33	Nux Vomica	6.76	6.76	16.39	83.61	“	1000	Fractional.	“
34	Yerba Santa	21.53	14.61	20.81	79.19	“	673	“	McLaughlin.
35	Yerba Santa	21.53	16.92	40.90	59.10	“	739	Simple	“
36	Dandelion	31.98	30.76	17.49	82.51	“	961	Fractional.	Klie
37	Dandelion	31.98	30.76	16.25	83.75	“	961	Simple	“
38	Ergot	14.76	18.45	31.25	68.75	“	1250	“	“
39	Ergot	14.76	16.61	13.42	86.58	“	1125	Fractional.	“
40	Rhubarb	44.41	40.00	41.10	58.90	“	901	Simple	“
41	Rhubarb	44.41	43.06	39.95	60.05	“	969	Fractional.	“

* The Fluid Extract being finished by the process of the Pharm. of 1860—omitting, however, t Acetic Acid—the quantity of Extracted Matter is given along with that absolutely in the finish preparation.

TABLE II.

NUMBER CORRESPONDING TO TABLE I.	FLUID EXTRACT.	SPEC. GRAV. OF MENSTRUUM.	SPEC. GRAV. OF FLUID EXTRACT.	WEIGHT OF **1** PINT OF FLUID EXTRACT.	VOLUME OF **16** TROY OUNCES OF FLUID EXTRACT.	PERCENTAGE OF EXTRACTED MATTER IN THE FLUID EXTRACT.	NAME OF EXPERIMENTER.
				Grains.	Pints.		
7	Gelsemium	0.840	0.877	6394	1.201	5.37	Diehl.
33	Nux Vomica	0.820	0.957	6977	1.101	6.76	Joy.
5	Ipecac	*0.941	0.988	7204	1.066	7.69	Diehl.
6	Cubeb	0.820	0.885	6453	1.190	8.45	"
32	Aconite-root	0.820	0.971	7080	1.085	9.22	Joy.
3	Ergot	0.941	1.006	7335	1.047	12.02	Diehl.
31	Ergot	0.941	1.010	7364	1.043	12.33	Miller.
30	Ergot	0.941	1.005	7327	1.048	12.61	"
34	Yerba Santa	0.836	0.932	6795	1.130	14.61	McLaughlin.
11	Cotton-root bark	0.882	0.959	6992	1.098	15.09	Diehl.
8	Aconite-root	0.818	0.911	6642	1.156	16.05	"
20	Jaborandi	0.937	1.012	7392	1.039	16.60	Scheffer.
39	Ergot	0.941	1.022	7451	1.031	16.61	Klie.
35	Yerba Santa	0.836	0.950	6926	1.109	16.92	McLaughlin.
25	Cimicifuga	0.895	0.955	6963	1.103	17.25	Scheffer.
12	Belladonna-root	0.882	0.968	7058	1.088	17.41	Diehl.
38	Ergot	0.941	1.024	7466	1.029	18.45	Klie.
2	Guarana	0.905	1.027	7488	1.026	20.76	Diehl.
16	Aconite-leaves	0.937	1.023	7459	1.030	20.88	"
10	Dandelion	0.935	1.035	7546	1.018	21.26	"
19	Cinchona	0.883	0.975	7109	1.080	21.27	"
22	Hydrastis	0.882	0.953	6948	1.105	21.31	Scheffer.
18	Lobelia	0.937	1.083	7896	0.973	21.65	Diehl.
26	Capsicum	0.819	0.893	6511	1.180	21.92	Scheffer.
14	Hydrastis	0.883	0.972	7087	1.084	23.16	Diehl.
28	Senna	0.941	1.060	7728	0.994	24.11	Miller.
29	Senna	0.941	1.065	7765	0.989	24.19	"
1	Eucalyptus	0.885	0.997	7269	1.057	25.37	Diehl.
15	Coto-bark	0.883	0.990	7218	1.064	25.44	"
17	Eucalyptus	0.883	0.992	7233	1.062	26.21	"
24	Dandelion	0.937	1.058	7714	0.996	28.90	Scheffer.
13	Liquorice	0.937	1.071	7809	0.983	29.24	Diehl.
27	Liquorice	0.937	1.054	7685	0.999	29.67	Scheffer.
21	Senna	0.936	1.063	7751	0.991	29.89	"
23	Dandelion	0.937	1.062	7743	0.992	29.89	"
36	Dandelion	0.941	1.086	7918	0.970	30.76	Klie.
37	Dandelion	0.941	1.087	7925	0.969	30.76	"
4	Gentian	0.944	1.117	8144	0.943	34.60	Diehl.
40	Rhubarb	0.942	1.120	8166	0.940	40.00	Klie.
41	Rhubarb	0.942	1.134	8268	0.928	43.06	"
9	Lupulin	0.918	1.034	7539	1.019	65.13	Diehl.

TABLE III.

Number corresponding to Table I.	Fluid Extract.	Percentage of Extracted Matter in Reserved Portion.		Percentage of Soluble Matter contained in Drug.	Name of Experimenter.
		By Simple Percolation.	By Fractional Percolation.		
11	Cotton-root bark	49.10	....	15.44	Diehl.
7	Gelsemium	51.82	....	6.14	"
12	Belladonna-root	57.52	....	15.44	"
40	Rhubarb	58.90	....	44.41	Klie.
35	Yerba Santa	59.10	....	21.53	McLaughlin.
4	Gentian	59.82	....	35.26	Diehl.
41	Rhubarb	....	60.05	44.41	Klie.
25	Cimicifuga	60.82	....	17.08	Scheffer.
1	Eucalyptus	62.50	....	25.37	Diehl.
27	Liquorice	63.66	....	29.61	Scheffer.
8	Aconite-root	64.47	....	16.32	Diehl.
22	Hydrastis	64.48	....	21.23	Scheffer.
9	Lupulin	64.70	....	61.51	Diehl.
18	Lobelia	65.61	....	22.42	"
20	Jaborandi	66.11	....	16.18	Scheffer.
23	Dandelion	66.43	....	26.58	"
28	Senna	66.88	....	27.71	Miller.
5	Ipecac	67.94	....	10.00	Diehl.
21	Senna	67.95	....	24.60	Scheffer.
38	Ergot	68.75	....	14.76	Klie.
2	Guarana	69.16	....	21.50	Diehl.
32	Aconite-root	70.66	....	9.53	Joy.
13	Liquorice	....	71.20	30.07	Diehl.
6	Cubeb	71.54	....	8.46	"
29	Senna	....	72.97	27.71	Miller.
16	Aconite-leaves	....	74.69	20.88	Diehl.
24	Dandelion	....	75.00	26.58	Scheffer.
17	Eucalyptus	....	75.32	25.37	Diehl.
30	Ergot	76.20	....	12.91	Miller.
14	Hydrastis	....	79.09	23.16	Diehl.
34	Yerba Santa	....	79.19	21.53	McLaughlin.
10	Dandelion	80.29	....	20.85	Diehl.
36	Dandelion	....	82.51	31.98	Klie.
26	Capsicum	....	82.69	22.27	Scheffer.
33	Nux Vomica	....	83.61	6.76	Joy.
37	Dandelion	83.75	....	31.98	Klie.
39	Ergot	....	86.58	14.76	"
31	Ergot	....	86.67	12.91	Miller.
19	Cinchona	....	87.14	21.27	Diehl.
3	Ergot	....	88.03	12.77	"
15	Coto-bark	....	88.08	26.21	"

TABULATED RECORD OF EXPERIMENTS ON FLUID EXTRACTS,

Made according to the scheme of Professor C. Lewis Diehl. By Charles Mohr.

Number	Date	Drug: Name	Drug: Quantity, Troy ounces	Drug: Fineness of Powder, Number	Menstruum: Proportion of Alcohol	Menstruum: Water	Menstruum: Specific gravity	Simple Percolation No. 1	No. 2	No. 3	No. 4	No. 5	Fraction A No. 1a	No. 2a	No. 3a	No. 4a	No. 5a	No. 6a	No. 7a	Fraction B No. 1b	No. 2b	No. 3b	No. 4b	No. 5b	No. 6b	No. 7b	In reserved portion, grams	In evaporated portion, grams	Relation: Reserved portion	Relation: Evaporated portion	Total in 1 pint fluid extract, grams	[illegible], grams	[illegible], grams	[illegible]	[illegible]	The Tincture: [illegible], grams	[illegible]	Relation: Tincture	Relation: Fluid extract	REMARKS
1	June 15	Valeriana	16	40	1	00	0.8[illegible]	1.0489	1.0497	0.0929	0.0694	0.054															790.45	653.58	1½	1	1418.7	[illegible]	1350.88	0.9152	18.16	0.6[illegible]	119[illegible].40	0.6[illegible]	1	
2	June 25	Stillingia	16	20	2	1	0.901	3.857	0.926	0.416	0.154	0.096															683.46	281.41	2½	1	964.8[illegible]	1.080	963.90		12	0.509	96[illegible].48	1	1	
3	July 8.	Cimicifuga	16	40	1	00	0.820						6.08	2.463	0.818	0.540	0.385	0.308	0.263	7.400	3.456	1.219	0.787	0.694	0.617	0.509	996.76	225.92	4½	1	1222.8	4.753	1122.89	0.9153	14.6	0.786	1108.01	1	1	0.898 | 1
4	July 21	Gentiana	16	40	1	1	0.935	7.160	4.830	3.000	2.808	0.601															1268	2009	1	1½	3277	13.60	321[illegible]	1.250	41.8	1.120	2703	1	1	[illegible]
5	Aug 6	Gentiana	8	40	2	1	0.901 65	9.871	6.180	1.928	0.247	0.154															875.6	752.0	1	1	3255	12.600	297[illegible]	1.082	38.8	No de[illegible]	[illegible]	Tin[illegible]	[illegible]	[illegible]
6	July 28	Taraxacum	16	40	1	1	0.9325	6.542	0.980	0.260	0.246	0.208															1148.8	300.83	3	1	1449.7	6.543	1445.	1.0302	18.8	0.725	1370.0	1	8	0.918 | 1
7	Aug. 8.	Zingiber.	16	40	1		.818						2.345	0.37	0.105	0.062	0.077	0.046	0.833	2.217	0.323	0.138	0.095	0.154	0.20	0.833	29[illegible].26	71.9[illegible]	4	1	367.20	1.543	363.82	0.858	5	0.1[illegible]	291.[illegible]	1	10	0.801 | 1
8	Sept 11	Guarana	16	40	2	1	.881	7.787	1.836	0.308	0.131	0.771															1376.94	417.75	3	1	1794.[illegible]	7.500	1771.87	1.0043	25	0.8025	[illegible]	1	9	0.871 | 1.
9	Sept 18	Hyoscyamus	16	40	2	1	.901						4.32	3.112	0.879	0.802	0.694	0.568	0.540	5.69	4.815	3.08	1.527	1.051	0.94	0.763	875.[illegible]	453.7	2	1	1330	5.586	1329.	0.9765	18	0.6[illegible]	1283.	1	8	0.965 | 1.
10	Sept 28	Senna	16	80	1	1	0.935						6.794	5.309	3.765	0.848	0.354	0.290	0.281	5.122	4.350	3.768	2.860	1.620	1.267	0.959	921.50	843.00	1[illegible]	1	1765.00	7.648	1763.4	1.0674	23	0.890	1680.00	0.950	1	
11	Sept 21	Hæmatoxy	16	80	U.S. 1	1	0.943	5.026	2.221	0.740	0.349	0.231															896.00	674.00	1¼	1	1570.0	6.700	1560.00	1.0421	20½	0.710	1[illegible].00	0.895	1	
12	Oct 22	Ergota.	16	40	1 1	1	0.935						2.838	1.234	0.895	0.463	0.208	0.138	0.084	4.150	1.739	1.276	0.8025	0.447	0.297	0.200	518.173	176.722	3	1	694.89	2.838	670.470	0.9884	8	0.3703	690.77[illegible]	1	1	
13	Oct 23	Buchu	16	40	1	00	0.818	2.048	.7176	0.5478	0.2469	0.200															371.765	342.23	1¼	1	714.04	3.060	717.20	0.8638	10.2	.3857	728.00	1	1	1.8
14	July 26.	Uva Ursi	16	40	1	1	0.956						11.800	9.877	2.253	0.354	0.150	0.138	0.108	10.987	9.248	8.519	6.186	1.897	0.771	0.550	1892.96	1059.13	1[illegible]	1	2952.04	11.790	2786.87	1.1146	27½	1.5279	2878.[illegible]	1.003	1	1.8

NOTES. *Cimicifuga.*—After a week's standing a slight resinous sediment, strongly adhesive to the bottom of the bottle, was observed.

Gentiana, No. 5.—The deficiency of [illegible] grams in the finished extracts results from an accidental loss in the evaporation. The extract bears light precipitate, flocculent, of light brown color. A menstruum of still greater alcoholic strength would be an improvement.

Taraxacum.—The percolation after No. [illegible] was continued until [illegible] ounces were obtained; the liquid was the color of sherry wine, but devoid of taste and smell.

Zingiber.—The last percolates, 7a and 7b, of a faint straw-color, almost without taste and odor, contain much larger quantities of extractive matter than all the preceding ones, except No. 1. Exhaustion complete, dregs entirely devoid of the volatile and resinous matters peculiar to the drug.

Guarana.—But a slight sediment perceptible after several weeks' standing. Menstruum used, [illegible] pints.

Hyoscyamus.—Sediment in the finished extract light. Menstruum used, 1[illegible] pints.

Senna.—The moistened powder was packed with some pressure; the percolation proceeded very slow at first, but regularly. In Fraction B, however, after the running of the last percolate, a portion of the drug in the centre was found to have remained untouched by the percolating liquid. The last percolate was still of a greenish-brown color, and perceptible taste and odor of the drug. According to the whole quantity of extractive matter obtained by the percolation of Fraction A, the finished fluid extract should yield 2085.7 instead of 1763 grams. Menstruum used, 1½ pints.

Hæmatoxylon.—The finished extract contains a rather copious heavy sediment of a lighter reddish tint. A menstruum of greater alcoholic strength is to be employed to insure a perfect preparation.

Ergot.—Percolation proceeded regularly in both fractions tightly packed; rate of exhaustion in both fractions equal. Last drippings of No. 7, *b*, still of wine-red color, but devoid of the odor and taste characteristic to the drug.

Buchu.—Notwithstanding the slowness with which the percolation was conducted, the large amount of extractive matter in the portion to be evaporated shows that the percolation was defective; the powder of the drug not fine enough, and packing too loose. Last drippings of a light green color, and very light odor and taste of the drug.

Uva Ursi.—Precipitate in the first four percolates of both fractions copious, of a dingy yellowish green color; also heavy in the finished fluid extract. The extract prepared with the menstruum employed must be regarded as a failure. Alcohol of not less than [illegible] per cent. would be a better, perhaps the proper menstruum. The evaporated portion was of the consistency of almost a solid extract, and in consequence a loss was sustained in the transfer to the reserved portion.

TABLE IV.

NUMBER CORRESPONDING TO TABLE I.	FLUID EXTRACT.	PERCENTAGE OF THE TOTAL EXTRACTED MATTER IN THE RESERVED PORTION.		DIFFERENCE IN FAVOR OF THE PROCESS EMPLOYED.	NAME OF EXPERIMENTER.
		By Simple Percolation.	By Fractional Percolation.		
40	Rhubarb	58.90	....	....	Klie.
41	"	....	60.05	1.15	"
35	Yerba Santa	59.10	....	....	McLaughlin.
34	"	....	79.19	20.09	"
1	Eucalyptus	62.50	....	....	Diehl.
17	"	....	75.32	12.82	"
27	Liquorice	63.66	....	....	Scheffer.
13	"	....	71.20	8.46	Diehl.
22	Hydrastis	64.48	....	....	Scheffer.
14	"	....	79.09	14.61	Diehl.
23	Dandelion	66.43	....	....	Scheffer.
24	"	....	75.00	9.43	"
10	"	80.29	....	....	Diehl.
36	"	....	82.51	....	Klie.
37	"	83.75	....	1.24	"
28	Senna	66.80	....	....	Miller.
21	"	67.95	....	....	Scheffer.
29	"	....	72.97	6.17	Miller.
38	Ergot	68.75	....	....	Klie.
30	"	76.20	....	....	Miller.
39	"	....	86.58	17.83	Klie.
31	"	....	86.67	10.37	Miller.
3	"	....	88.03	....	Diehl.

REPORT OF THE COMMITTEE ON EXHIBITION OF SPECIMENS.

The exhibition was tastefully and conveniently arranged, in the lower end of Concordia Hall.

DRUGS.

Mr. James Steele, of San Francisco, Cal., exhibits samples of twenty-seven specimens of California medical plants, and three of drugs derived from tropical plants, viz.:

1. Balsam Plant, Gnaphalium Macrocephalum.
2. Bitterweed, Helenium Puberulum.
3. Blue Gum of Australia, Eucalyptus Globulus.
4. California Buckthorn Bark, Rhamnus Crocea.
5. Butterfly Plant, Bahia Arachnoidea.
6. Cascara Sagrada, Rhamnus Purshiana.
7. Damiana, Turnera Aphrodisiaca?
8. Fly Plant, Mimulus Glutinosus.
9. Ginger Leaf, Eremocarpus Setigerus.
10. Gum Plant, Yerba Santa, Eriodyction Californicum.
11. Kidney Plant, Baccharis Pilularis.
12. Manzanita, Arctostaphylos Glauca.
13. Packballs, from Quercus Densiflora.
14. Oregon Grape or Barberry of California, Berberis Aquifolium.
15. Oregon Grape, Berberis Repens.

Resin Weeds of California Grindelia Species, including:

16. Grindelia Integrifolia.
17. Grindelia Robusta.
18. Grindelia Squarrosa.
19. Rhus Diversiloba.
20. Spikenard, Aralia Californica.
21. Tarweed, Hemizonia Truncata.
22. Turpentine Root, Wyethia Helenoides.
23. Yerba Buena, Micromeria Douglassii.
24. Yerba Reuma, Frankenia Grandifolia.
25. Avá Kava, roots of Piper Macropiper Methysticum.

From the Feejee and Sandwich Islands.

26. Cedron, Drupes of Semaba Cedron, from South America.

27. Coca, Leaves of Erythroxylon Coca, Peru, Ecuador, and Bolivia.

The California herbs were exhibited in bundles of the whole plants, in the flowering state, recently collected, of great freshness of appearance, and with the characteristic odors, evincing, like the other specimens, a state of highest perfection. As quite a number of these drugs seem to be more than ephemeral novelties, and judging by their already acknowledged merits, are destined to take a permanent place in the list of our Materia Medica, the intrinsic value and interest attached to this exhibit consisted in offering a true standard of their nature and qualities, and an opportunity for a nearer acquaintance with them rarely to be enjoyed.

Mr. J. U. Lloyd, of the firm of Merill, Thorp & Lloyd, Cincinnati, exhibited thirteen specimens of crude drugs, mostly California plants, amongst those the different species of Berberis (Mahonias), which under the name of Oregon grape have of late found their way into the market, viz.: besides the well-known Berberis aquifolium, specimens of B. nervosa, B. repens, B. pinnata. Of foreign origin, the bark of Mangifera indica, slightly aromatic and astringent.

Mr. Lloyd also exhibits the bark of Rhamnus Purshiana, with a good botanical specimen of the same shrub, leaving no room for doubt as to its identity, and a sample of the herb of Frankenia grandifolia in a fine state of preservation. He refers, in tracing up the sources of the so-called Cascara Sagrada and the Yerba Reuma, the first to the above bark, and the latter to the herb last mentioned, and thereby claims to have removed the veil of mystery which heretofore surrounded the preparations of these drugs since they were thrown upon the market.

A lot of vegetable drugs of fine quality, including the bael fruit, areca or betel nuts, Goa powder, xanthium spinosum, with others of late brought to notice from California, were contained in the exhibit of Messrs. McKesson & Robbins. In connection with these we have to mention the Herbarium Pharmaceuticum, or the officinal plants of the German flora, exhibited by that firm. The beauty and arrangement of the specimens of these collections leave nothing to be desired, and they are certainly to the student of medical botany a most welcome aid.

CHEMICAL AND PHARMACEUTICAL PREPARATIONS.

Messrs. Powers & Weightman, of Philadelphia, exhibit the products of their manufacture in their usual rich and extensive display of elegant arrangement, consisting of massive quantities of the salts of the alkaloids of the cinchona barks, sulphate and muriate of morphia, strychnia, citrate of caffein; also large crystals of tartaric and citric acid, arsenite and oxalate of iron, the various iron scale preparations, carbonate and ammoniated copper, valerianate of bismuth, nitrate of silver in crystals of unusually large size, the officinal mercurial preparations, and the essential oils of cloves, pimento, cubebs, and copaiva.

Messrs. Rosengarten & Sons made a rich and fine exhibit of their sulphates of quinia, cinchonia, cinchonidia, and quinidia, in large quantities, sulphate and muriate of morphia, nitrate of bismuth and nitrate of silver.

Mr. J. U. Lloyd, of the firm of Merill, Thorp & Lloyd, Cincinnati, made a display of rare beauty and interest of the bases and their salts found in Hydrastis Canadensis, consisting of large masses of sulphate of berberin in minute acicular crystals, pressed cakes of the impure salt, already of a remarkable clear orange color, muriate and nitrate of berberin, the alkaloid hydrastia in prismatic crystals nearly an inch in length, and a series of its salts. These preparations exhibited represent the products obtained from fifteen hundred pounds of the root. Podophyllin of different shades of color, as obtained from tinctures of different stages of percolation and by precipitation with pure or alum water, explaining the differences in color under which this article is found in commerce. Hydrocyanic acid with a large percentage of alcohol; the sample, after being kept for four years in a partly filled bottle, opened frequently, is perfectly limpid and colorless, and judging by its odor, of unimpaired strength. Two small vials, out of a lot of sixty, filled with acid of the same lot, contained the acid blackened and decomposed, in consequence, as Mr. Lloyd states, of the acid having come in contact with the wax used in fastening the glass stoppers. Also fluid extract of Mangifera indica.

Messrs. McKesson & Robbins, New York, make a tastefully arranged display of a full line of solid and fluid extracts, their well-known soluble gelatin-coated pills, of beautiful appearance, and of a great variety of essential oils and essences for perfumery.

Messrs. Wyeth & Bros., Philadelphia, exhibit a large line of elixirs, fluid extracts, their various compressed pills and tablets, and Bishop's effervescent granular salts.

Messrs. Hance & Brother, Philadelphia, present a full line of elixirs, fluid extracts, sugar-coated pills, troches, podophyllin, leptandrin, ergotin, muriate of berberin, acetate and muriate of amyle, and pure amylic alcohol, with other pharmaceutical preparations.

Messrs. William R. Warner & Co., Philadelphia, had an extensive assortment of their sugar-coated pills and parvules on exhibition, with a series of granulated effervescent salts of very fine appearance.

Messrs. Thayer & Co., Cambridgeport, Mass., show a large number of fluid extracts, including those of recent introduction; also podophyllin and hydrastin.

Mr. C. L. Mitchell, Philadelphia, exhibits soluble medicated gelatin bougies and intra-uterine pencils, in forty-eight varieties, according to their medication. These bougies combine, with a high degree of flexibility, the proper solidity, and can be regarded as equal to the French article.

Mr. E. Scheffer, Louisville, Ky., exhibits samples of his saccharated and dry pepsin.

Mr. C. P. Candidus, Mobile, Ala., has a sample of orange flower water, distilled of Mobile orange flowers, of very good quality.

Mr. Charles Mohr, Mobile, shows fourteen samples of various fluid extracts prepared in accordance with the scheme of Prof. Diehl, by simple and fractional percolation, with the crude drug employed, the exhausted drug, and the corresponding tinctures made to serve as means of controlling the experiments, with tabulated records of the same.

PHARMACEUTICAL APPARATUS AND APPLIANCES.

Messrs. Hance & Brother exhibit their drug mills, with self-regulating feeders, and their non-wasting percolating and filtering apparatus, which are well known to the druggists of the country.

Messrs. Parke, Davis & Co., exhibit Whitfield's capsule filler.

Mr. W. W. Heritage, Philadelphia, shows his pharmaceutical still, which for convenience and economy, particularly in recovering alcohol, was regarded by the members as a most useful piece of apparatus.

The silicated carbon filters of Mr. H. P. Mensing, New York, in their different sizes and styles, from the pocket and table filter to the household and the large main supply filter for filtering under pressure, attracted much attention.

Mr. Otto Witte, New York, made a good display of his handsome enamelled glassware, which was much admired, new styles of glass labels, lettered and numbered graduates, receivers, etc.

MISCELLANEOUS ARTICLES.

Amongst these a collection of two hundred and twenty-eight species of plants, representing the flora of Central Georgia, made and exhibited by W. S. Grant, M.D., of Atlanta, attracted the attention of the members. The specimens, carefully named, were fastened upon sixteen large cards, of which six were occupied by species of the difficult order of Compositæ, one by Gramineæ, and the rest by the other various phanerogamous orders.

Dr. Frederick Hoffmann, of New York, exhibited Hager-Mester's microscopes in several styles. Simple in construction and with objectives of good powers of definition, they are cheap, so as to place an instrument fully adapted to the wants of the pharmacist and student within the reach of almost every one.

Paper-fibre lint, manufactured by Joseph Parker & Sons, New Haven, Conn.

Paper-fibre lint, by Wyeth & Brothers, Philadelphia.

Dental floss, by Heppner & Co., New York.

Mr. Theodore Ricksecker, of New York, exhibits a lot of druggists' sundries and Westthorp's marine and hospital lint.

Mr. Camille Reed, Boston, a large assortment of druggists' pasteboard boxes, envelopes, and labels.

Respectfully submitted,

Charles Mohr,
Henry J. Rose,
E. Scheffer,
C. W. Hancock,
Jesse W. Rankin.

SPECIAL REPORTS AND ESSAYS.

I. PHARMACY.

ON CELLAR AND STORE-ROOM.*

BY JOHN F. HANCOCK.

QUERY 56.—An Essay, suggestive and critical, on the best plan of arranging and managing the store-room and cellar of a well-conducted dispensing store.

IN considering the subject before us, location, condition, and various circumstances shade the coloring of each establishment, rendering it necessary in each case to curtail or extend the general plan of arrangement.

Year by year the character of trade is becoming more decided. Two general plans are being adopted by the votaries of Pharmacy. 1st. An establishment where all kinds of medicines, preparations, and general merchandise is dispensed and but few articles manufactured. 2d. An establishment in which the two interests of manufacturing and dispensing are blended. The 3d class, known as manufacturing pharmacists, without a dispensing department, does not come within the range of our query, and consequently will not be considered here.

The store in which the manufacturing interests consist only in the preparation of the more simple galenicals, ordinarily one store-room will suffice, in which event an upper room is preferable, except so much of the cellar as may be necessary for fuel and odds and ends of shop furniture, etc., abandoned, but reserved with the hope or expectation that at some time it may come into use. Sometimes one or two preparations may be run by the proprietors as specialties and prepared in a mystical manner after the fashion of Macbeth's witches. In such a case a dark cellar is most admirably adapted to the manipulation. Our remembrance is very distinct of such an underground arrangement belonging to a drug store having a lucrative business. The place is best described by quoting the language of an assistant connected with the establishment. The gentleman in question (now deceased) was proverbial for his suggestive remarks, and our remembrance of his preparation for descending to the abode of darkness provokes a smile. He reserved a special uniform to wear on the occasion of his periodical visits to the place of darkness. A sadness and distress of countenance was observable for some minutes previous to his descent. Finally, with a steady, solemn step, he would approach the door, and looking back with all the demeanor of one who never expected to return to sunlight, he would remark, " Well, the Good Book tells me that hell is a place of darkness, and I am forced to conclude that this drug store is closely connected with that institution."

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* Read at the Fifth Session.

The query specifies "a well-conducted dispensing store." Therefore the few remarks we have to make will bear particularly on the pharmacy with laboratory and store-rooms in which all the more important manipulations of manufacturing and dispensing are united. In such an establishment a stock of raw materials are to be stored. Apparatus and implements must be included in the general stock, and empty bottles, boxes, etc., are to be represented in appropriate places. System and order must be of first consideration, which to inaugurate, space and apartments are necessary. To assume proprietorship of such a store we must first arrange the dispensing department and then shape the other departments to meet its wants. Next in importance is the laboratory, which should be conveniently arranged for work, and not incumbered with unnecessary apparatus. This should connect directly and conveniently with the cellar. The latter to be lighted by the sun as much as possible and kept dry. In the cellar all heavy goods not likely to be injured by a confined atmosphere should be stored. Care should be taken to purify the atmosphere of the cellar as much as possible, in which event it is a most admirable place to exercise young aspirants to pharmaceutical honors at the mortar and pestle, drug mill, etc., also to store vials and the like. These should be arranged with regard to sizes and styles so as to be of easy access. Cases in such a store-room are well adapted for stock bottles containing herbs, roots, tinctures, syrups, etc. A well-lighted dry cellar is indispensable to a well-regulated pharmacy, principally for the following reasons: Its uniform temperature at all seasons; the solidity of the floor rendering it pre-eminent for grinding, powdering, and mixing drugs, etc.

Leaving the cellar we ascend to the laboratory and locate a store-room connected therewith, to be used as a repository for apparatus not in immediate use. In this room all purchases are to be received, examined, and assorted before being taken to the dispensing department. This should be on the first floor if possible. In addition to the foregoing a third store-room is of great importance in which to keep the surplus stock of preparations, and prepare perfumery, Seidlitz powders, and the like.

November 25th, 1878.

MISCELLANEOUS NOTES.*

BY J. U. LLOYD, CINCINNATI, OHIO.

Dilute Hydrocyanic Acid.

The results of a few experiments were given in the Proceedings of 1875, page 695. In continuation I note as follows:

Of the one hundred and twelve one-ounce vials filled with the acid (see page 698) two have decomposed, the contents are black. This acid has been securely stopped. (Specimens on exhibition.)

The acid mentioned on page 698 as being made in July, 1874, and placed in a gallon glass-stoppered bottle, has been subjected to the following conditions:

In January, 1876, a few ounces of acid were removed, the vial left open an hour or so, the stopper then replaced. This operation was repeated occasionally until August of the present year, at which time but a few ounces remained (see specimen 3), which is now limpid.

It possesses strongly the odor of hydrocyanic acid and contained, August 23d, 1878, one and forty-three hundredths (1.43) per cent. anhydrous acid; thus showing that the value of the remaining acid has decreased about one-fourth.

The conditions to which this acid has been subjected have been very severe; it has not decomposed.

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* Read at the Fifth Session.

Of the two ounces of acid that disintegrated in glass-stoppered vials, both stoppers were waxed, and the wax came into contact with the liquid. (See specimens 4 and 5.)

Of all the specimens of acid I have experimented upon containing alcohol instead of water, none have decomposed if free from organic matter.

TINCTURE OF GERANIUM MACULATUM.

In my report upon fluid extract of gossypium, read before the meeting of 1876, on page 525 occurs the following: "Fluid extract of Gossypium, Cinnamon, Chionanthus, Geranium Mac., and Senega will occasionally solidify when made of dilute alcohol. I have never known either of them to do so if alcohol only is used."

An exception I find in Geranium. Of a tincture made in March, this year, two gallons solidified in June. It was made with alcohol .835 sp. gr. The article has lost its rich red color, is scarcely astringent, and has acquired a faint odor resembling wintergreen. I can offer no explanation of the cause other than previously given. I am not aware that the conditions observed in making the tincture or its preservation have been altered in the least. (See specimens 1 and 2.)

Mangifera Indica (Specimen 17) is an astringent bark from the Indies. It has been recommended for diarrhœa and diseases of the mucous surfaces. The tree from which it is obtained is described on page 716 Lindley's *Treasury of Botany*.

I have heard some excellent reports from the use of the fluid extract, and in one instance that came under my especial notice, quick relief was afforded to a very severe case of diarrhœa.

The extract is very astringent and not unpleasant (specimen 18). The bark is used for various medicinal purposes in its native country, and is, I think, worthy the attention of medical men.

It was brought to my notice by Dr. M. F. Linguist, of New Haven, Conn., who had used an infusion of the bark and recommended it very highly.

Of this bark Dr. Masters remarks: "The bark is employed medicinally to restrain discharges from the mucous membranes, and has been likewise well spoken of in the treatment of fevers in St. Domingo."

SOME SPECIMENS OF WESTERN PLANTS.

Bryzopyrum spicatum (Specimen 6), or common salt grass of California and adjacent country, was sent by mail to the drug house with which I am connected, as the plant from which the liquid preparation known as fluid extract of "Yerba Reuma" was derived.

The specimen was sent by Dr. C. H. Adair, of Colusa, California, a partner or former partner of Dr. Bundy, both of whom have furnished certain printed articles upon this "*Yerba Reuma.*" In a few days another specimen was received, with the information that by mistake "the young man had sent the *wrong article*," that the second was "the true *Yerba Reuma.*" My brother had named the first B. spicatum, but not being familiar with the flora of California, inclosed specimens to a few authorities, who answered in accordance. Thus it will be seen that the above is not "Yerba Reuma," according to Dr. Adair, and certainly I would not question his authority upon this point.

Frankenia grandifolia (Specimen 7) is the second plant sent by Dr. Adair. I offer the name upon the authority of Prof. Sereno Watson, of Harvard University. This plant is salty to the taste, more so indeed than the B. spicatum. It is common in California, but not known under the name "Yerba Reuma," that I can learn of, even to those around Dr. Adair, for he writes, "I am sure there is no such plant; you are deceived in a name." This second plant has also lately been obtained from a house in this city as "Yerba Reuma."

Rhamnus Purshiana (Specimen 8) was sent at the same time for the bark, which, when extracted, yielded "fluid extract of Cascara Sagrada." Dr. Adair said that the name "Cascara Sagrada" was a deception, that a botanist pronounced the plant "Rhamnus Persica."

Doubtless R. Purshiana was intended, as the bark came from that shrub, the leaves of which have since been received from Dr. Adair, and identified (see specimen 8½).

I would not question the authority of Dr. Adair, who, I think, is in a position to learn the name of the shrub, which can yield a bark which will produce an extract whose name is "Cascara Sagrada."

Berberis aquifolium (Pursh), (Specimens 9 and 10), another California introduction, has occasioned some trouble to our druggists and pharmacists. It was brought before the public through the Yerba Reuma, Cascara Sagrada route, from California.

There are four species of Mahonia, all called mountain grape, all common to the far West. They all possess similar properties. Berberis aquifolium is very plentiful, but B. repens, B. nervosa, and B. pinnata are being substituted, doubtless through ignorance. (See Specimens 11, 12, 13, 14, 15, and 16.)

FLUID EXTRACTS BY REPERCOLATION.

BY EDWARD R. SQUIBB, OF BROOKLYN.

As the time approaches for a revision of the U. S. Pharmacopœia those parts of it which require the most time and labor should be recognized, that due consideration may be given to them; and there is certainly no department of the work where more time and labor is needed than upon the fluid extracts and extracts. Should the Committee of Final Revision fail to find and adopt the best plan of making this important class of preparations, the Pharmacopœia, instead of being the model and standard of the nation, will be surely disregarded and left behind by the practice and the results of the large manufacturer, and the evil of the present will be confirmed and fastened upon the future.

It will not do for the committee to disregard any plan because it is laborious, or troublesome, or expensive, or complicated, or because it is not adapted to the knowledge and capacity of the large majority of physicians and pharmacists. These, though very important, are still secondary considerations. The thing to be accomplished in the Pharmacopœia is to have practically perfect preparations in every respect. That is, preparations that are really what they profess to be. They should contain all the active and useful parts of the drug in their natural conditions and associations; should reject as far as practicable the inert and useless portions of the drug; and should bear the established relation to the drug, of minim for grain; or, weight for weight, if this can be accomplished without materially disturbing the established relation. To effect this object a general scheme, plan or process can be adopted, and then every drug must be studied carefully and laboriously.

The original process of Professor Procter accomplished the exhaustion of the drug insufficiently, but that difficulty can be easily remedied by carrying the percolation farther. But the concentration of the weaker percolate to obtain the established relation between the drug and the fluid extract presents difficulties which are probably insurmountable by that process. It is not simply by the heat and oxidation of the evaporation process that all the harm is done to that portion of the preparation, but the active principles are so dissociated and split up by the concentration that they are no longer in their natural condition, but form new relations and combinations, which change their solubilities and bring a new set of reactions into play, making the preparation something else than what it professes to be. The evidence of this is found in the fact that a resinous or oleaginous drug can be thoroughly exhausted by a menstruum which will permanently hold all its constituents in solution. But if such menstruum be evaporated off, the same menstruum will not dissolve and hold the extract again. Nor will any other menstruum ever again reconstruct the extract or restore it to its original condition. For example, a diluted alcohol will exhaust buchu and will hold the oil, while in its natural relations with other constituents of the leaf, in the same kind of combination or emulsion that exists in the leaf before extraction, and in such a solution, though very dense, the oil does not change in odor much, if at all more rapidly than the leaf does. But if such a solution be evaporated until the oil is precipitated and shows itself as a fully formed oil, the same strength of alcohol will not redissolve it. Nor will any strength of alcohol redissolve the whole of the extract, or recombine its once separated elements into their natural condition. And moreover, the oil, when separated, changes its physical properties more rapidly than when in its natural condition in the leaf, or than when separated with its natural associations unbroken. These circumstances constitute the chief objection to the original process, and to many of the original menstrua of Prof. Procter, and led the present writer to try to make improvements both in the process and the menstrua.

This effort at improvement by the writer was begun in a paper published in the Proceedings of the Amer. Pharm. Asso. for 1865, p. 201. To diminish the proportion of alcohol in the menstrua, and to economize its use, were the principal objects of this paper, and it is cited here for reference in regard to the importance of the points there insisted upon, because these points have not attracted the attention they deserve.

The effort at improvement was continued in 1866 by a paper published in the Proceedings of that year, p. 81. In this paper the method by repercolation was first proposed and described as overcoming the principal objections to the previous methods.

This method of repercolation has now been exclusively used by the writer for nearly twelve years in the production of many thousands of pounds of all the principal fluid extracts, and the object of this paper it to sum up this experience, and publish the modifications of the process, as they have been suggested and successfully applied during this prolonged experience, with a view of bringing the process more prominently into notice in order to be critically examined and tested. The general results of the application of repercolation, in the writer's hands, are, that no other process yet proposed accomplishes the main objects so well; and therefore that unless some new process can be devised that may attain the objects better and more accurately than this, it should be the process adopted for the Pharmacopœia.

Papers by the writer in 1867 upon the same subject, as applied to the cinchonas, may be found in the Amer. Journ. of Pharm. for July, August, and September, and in the Proceedings of the Amer. Pharm. Asso. for 1867, p. 391. All the principles involved in percolation and repercolation were fully discussed and illustrated in these several papers, but they seemed to attract little attention, and they are cited here to avoid recapitulation, since they cover nearly every point which the writer has now to bring forward. But the papers also contain many details which accumulating experience has improved and materially modified.

About 1870 a new form and arrangement of percolator was devised by the writer, and was put into practice so successfully that two years later in the Proceedings of the Amer. Pharm. Asso. for 1872, p. 182, an account of it with a cut, were given in detail. This contrivance has now been in use continuously for about 8 years, upon every scale from 4 ounces to about 400 pounds, and by pretty thoroughly carrying out the principles involved in percolation, it has contributed very largely to the success and uniformity of the process in the writer's hands. But the apparent complication of this device, and the details of repercolation, seem to have operated against any general understanding of the process, so that it has probably been generally condemned without sufficient trial; while the physical laws which govern the relations between liquids and solids in the direction of discriminative solubilities have been still too much overlooked, in favor of the earlier and more simple processes.

Whatever may be said of the older processes in regard to simplicity and facility of application, by which they are adapted to any capacity, and thus go into general use, it may also be said with great certainty that under the ordinary conditions of their general use, they do not accomplish their object to a reasonable extent, or as well as other processes now known; and that, although the resulting preparations are put forth in the Pharmacopœia as representing the drugs minim for grain, they do not really come near to this relation. The variations in the quality of the drugs used, and the variations in the moisture which they contain, are elements of so much uncertainty and want of uniformity in the liquid preparations made from them, that it becomes very important to reduce all other sources of variability to a minimum.

Repercolation, well applied, leaves little to be desired in making a liquid preparation that will fully represent the drug in almost any desired relation of strength; and if indifferently applied, the inaccuracies of one operation are so made up and controlled by those which follow that when the results of the different operations or percolations of the process are mixed together the general results must practically be good and uniform.

Indeed, so satisfactory has this process been in the writer's hands for the last 8 or 10 years, that the difficulties of making good fluid extracts have been entirely confined to the getting of good materials to make them from, and in controlling the hygrometric moisture in such materials when used. And in view of the satisfactory results, the inconveniences of the process and the disadvantage of having to carry a large stock of the weak percolate from each drug, seem now to be of very much less consequence than at first.

Upon finding out how much more serious these inherent objections to repercolation appeared to others than to himself, and how little credit the process obtained for its results in the way of counterbalancing these objections, the writer set himself to the task of trying to simplify the apparatus and the process to the utmost extent that could be done without sacrificing the principles upon which the success depends; so that by doing away with the machinery and apparent complication of a special percolator, and as many details as possible, the process might appear less objectionable beside the older methods, and thus induce pharmacists to learn it and try it long enough to become expert at it, and to be able to judge wisely in regard to its practicability and its appropriateness to pharmacopœial use.

These efforts at simplification are now to be set forth for whatever they may be worth, and they may be best introduced here by a model process.

For this model process it may be well here, again, to take the most difficult substance known to the fluid extract maker, namely, cinchona bark. This was one of the substances investigated in the papers of 1867 above referred to, and they may be usefully read as including some points of investigation omitted here, and especially in regard to testing the alkaloid value of different portions of the percolates.

The cinchona used in the model processes to be given is of exceptionally good quality, and therefore exceptionally difficult to exhaust. It is a yellow cinchona from the C. officinalis cultivated in Java, and contains about 9 per cent. of total alkaloids, of which about 7 per cent. is quinia. It is therefore more than three times the value of officinal yellow cinchona, and when such barks are used for making the fluid extract, this should be reduced to some standard of strength. That is, the Pharmacopœia should direct that its fluid extract should have a definite alkaloid strength. In these model processes, however, this cinchona is used as if it was of the ordinary quality.

As the preparation of this paper for publication was undertaken by the special request of the Committee of the Amer. Pharm. Asso. on the Pharmacopœia for use in connection with their work of finding out the best way of making fluid extracts, the details of the processes must be given with a minuteness that may seem useless and tedious. Beside, it is a prominent object of the writer to show how, in his judgment, every individual fluid extract must be studied before it is adopted by the Pharmacopœia, if the utility and character of the Pharmacopœia as a standard for the nation is to be restored to it. Who is to do this work, and who is to pay for the time, skill, and labor necessary to do it well, are problems for the future.

The first most important question is that of a proper menstruum. The present officinal menstruum having proved objectionable soon after the Pharmacopœia was issued, a menstruum was adopted by the writer containing 109 parts alcohol of sp. gr. .817, 16 parts water, and 41 parts glycerin. This menstruum has now been in successful use for many years and affords good exhaustion, and a fluid extract which weighs 7685 grains to the pint. This is almost exactly minim for grain and weight for weight. But as the drug never is quite exhausted even under the very best management the measure never should have been made minim for grain if the drug was to be fairly and fully represented by the fluid extract. As a rule of actual practice, the drug will not often be exhausted within 5 or 10 per cent., and by the officinal management, will fall greatly below this. A more accurate proportion would have been 90 to 95 minims to each 100 grains of drug, or about 8000 grains of drug to make a pint of fluid extract, each minim of which should represent a grain of the drug. Even by repercolation some such excess is needed to make the therapeutic relation what it professes to be. Beside this objection of being too close in theoretical relation to be true in practical value, this menstruum has long been believed to be unnecessarily strong in alcohol, and containing too much glycerin. The glycerin in many cases has a secondary use in menstrua which is hardly less important than its primary use as a solvent. It has the property of wetting substances, and permeating them to the exclusion of air, to a much greater degree than water or alcohol, and, when mixed with water or alcohol, imparts this property to the mixture. When used at all, therefore, it must be used with both these functions in view, and one step beyond this is objectionable. After a preliminary set of percolations with this old menstruum to observe how it would work on the small scale of 4 troy ounces of powder to each percolation, a new menstruum was tried consisting of 2 parts stronger alcohol, 2 parts water, and 1 part glycerin, and a preliminary set of percolations upon the same scale of 4 troy ounces gave good results, but proved that the scale was so small as to need especial skill and care in order to attain the desired accuracy.

Another tentative trial was then made with this new menstruum on a scale of 8 avoirdupois ounces at each percolation, and this proved to be a much less troublesome scale. And for cinchona it is about as small a scale as can be worked to advantage. An avoirdupois pound would be better and easier still. The details of these trials need not be given, and it is sufficient to say that they indicated, and gave a part of the necessary experience needed for another careful trial, in which two very important points were still to be settled, namely, the proportion of menstruum and weak percolate that was best to moisten the powder, and the length of time that was best to macerate each portion, the trials having shown that great variation was produced by both these elements. It was at first believed that 4 parts of liquid was sufficient to moisten eight parts of powder, and that 24 hours was long enough to macerate, and the first two percolations of the following series were made with these conditions. In the third percolation the liquid was increased to 5½ parts, and the maceration kept at 24 hours. In the fourth the liquid was increased to 6 parts. In the fifth it was kept at 6 parts, and the time of maceration was extended to 48 hours. In the sixth percolation it was increased to 7 parts, and the moistened powder, covered closely, was allowed to stand 8 hours to absorb the liquid more thoroughly. Then the powder was passed through a No. 8 sieve, packed pretty firmly, filled with weak percolate and then macerated for 48 hours, making a total maceration of 56 hours.

The first percolation of the series, made with fresh menstruum throughout, is of course a simple percolation, and was carried to practical exhaustion. And this practical exhaustion was doubtless to within 5 or 10 per cent. of absolute exhaustion of all matters soluble in the menstruum. The residue was quite tasteless for more than half way down the percolator, and then began to be very slightly bitter. This bitterness increased until at the bottom of the percolator it was quite distinctly bitter, after percolation under very favorable circumstances with nearly four times its weight of menstruum.

It is quite certain that the extract obtained from a drug by percolation is not uniform throughout the percolation in its medicinal value. If the menstruum be well adjusted as a solvent of the active principles of the drug it will dissolve and carry out the most soluble portions first and in largest proportion, so that although doubtless some of the useful part continues to be present in all parts of the percolate and its extract, yet the proportion must diminish much more rapidly than the proportion of extract. This point is well shown, so far as cinchona is concerned, in a table given by the writer in the "Amer. Journ. of Pharmacy" for 1867, p. 402, where each portion of percolate and its extract were assayed for the total alkaloids they contained. Hence, though the quantity of dry extract yielded by different portions of the percolate be not a measure of the medicinal value of the percolate, it is still the best guide that is easily accessible. Bearing in mind then that medicinal exhaustion by percolation is more rapid than absolute exhaustion, and that the dry extract which measures absolute exhaustion becomes poorer in medicinal efficacy and richer in inert extractive matter, and that this divergence in value is greatest near the end of the process, the quantity of dry extract yielded by each fraction of the percolate is adopted as the most convenient measure of the rate and the extent of the exhaustion.

The want of uniformity introduced into this series of percolations by the variation in the quantity of liquid used to moisten the several portions of the powder, and the variation in the time of maceration, diminishes the value of the series as illustrative of the best results of repercolation, and made it advisable to add a fifth and a sixth percolation to show the true character of the process when fairly established in actual practice; and thus these two percolations become by far the most valuable of the series as results of repercolation in actual practice, whilst the formula and process merely show how to begin to use repercolation.

The formula and process now to be given embrace the experience obtained in making the series which it represents, and is offered as a model by which other trials should be made by other hands, with other varieties of cinchona.

Take of

Yellow cinchona, in powder No. 50,		32 parts.	
Stronger alcohol,*	s. g. .819 at 15.6° C. = 60° F., or s. g. .811 at 25° C. = 77° F.,	2 parts.	For a sufficient quantity of menstruum.
Glycerin,	s. g. 1.250 at 15.6° C. = 60° F., or s. g. 1.244 at 25° C. = 77° F.,	1 part.	
Water,		2 parts.	

Weigh the stronger alcohol, glycerin, and water in succession, in any convenient quantity at a time, into a tared bottle, and mix them thoroughly for a menstruum.

Moisten 8 parts of the cinchona with 8 parts of the menstruum, by thoroughly mixing them, and allow the mixture to stand 8 hours in a closely covered vessel. Then pass the moist powder through a No. 8 sieve, and pack it firmly in a percolator. Pour menstruum on top until the mass is filled with liquid and a stratum remains on top unabsorbed; cover the percolator closely and macerate for 48 hours. Then arrange the percolator for an automatic supply of menstruum, and start the percolation at such a rate as to give 1 part of percolate in about 4 hours. Reserve the first 6 parts of percolate and continue the percolation until the cinchona is exhausted, separating the percolate received after the reserved portion into fractions of about 8 parts each.

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* It is hoped that in the next revision of the Pharmacopœia the "Alcohol" (sp. gr. .835) may be dropped, and the simple name Alcohol be applied to a clean spirit, of about the sp. gr. here given.

Moisten a second portion of 8 parts of the cinchona with 8 parts of the weak percolate—the portion that was obtained next after the reserved percolate—and allow the moist powder to stand for 8 hours in a vessel closely covered. Then pack it moderately in a percolator, and supply the percolator automatically with the remaining fractions of the weak percolate in the order in which they were received, and finally with fresh menstruum until the cinchona is exhausted. Percolate in the same manner and at the same rate as with the first portion of cinchona, and reserving 8 parts of the first percolate, separate the weaker percolate into fractions of about 8 parts each.

Percolate the third and fourth portions of 8 parts each of the cinchona in the same way as the second portion.

Finally mix the four reserved percolates together to make 30 parts of finished fluid extract; and having corked, labelled, and numbered the bottles containing the fractions of weak percolate, set them away until the process for cinchona is to be resumed.

When this fluid extract is to be again made, repeat the process as with the second portion, and reserve 8 parts of the first percolate as finished fluid extract from each 8 parts of cinchona from that time forward so long as the fractions of weak percolate are carried forward with which to commence each operation.

In applying this formula and process each part was taken as an avoirdupois ounce, and therefore each percolation was made with a half pound avoirdupois of the cinchona; and the menstruum was made in a tared bottle from time to time as required.

As before stated, the series was made to consist of 6 percolations, and therefore the last 2 are in addition to the 4 of the formula, as if the process had been twice resumed, and the results of these 2 are entitled to most attention as showing the true practical character of the process of repercolation. And every percolation which might follow these can be demonstrated mathematically to approach nearer and nearer to accurate results the farther the series is extended, since every successive percolation tends to correct the errors and improve the accuracy of those which have preceded it.

For the purposes of this paper as a model, and to construct the following table, the percolate from the first five percolations of this series was divided into much smaller fractions than is directed in the process, or needed in actual practice, leaving for a subsequent table the model for actual practice. The fractions of the first 5 were somewhere near 2 parts or 2 ounces each, = 56.7 grams. It was not easy to get them uniform in weight, and therefore this was not attempted. Each fraction was shaken up and accurately weighed. Then about 1 cubic centimeter was measured off into a tared shallow watch glass, and quickly weighed to avoid loss by evaporation. These weighed portions were then dried by steam heat until they ceased to lose weight and the residue carefully weighed. This gave the data for calculating the total residue which each fraction would give if the whole fraction had been evaporated. But a large proportion of this residue was glycerin, and it was sought to get at the extract only. So a cubic centimeter of the menstruum was weighed and evaporated in the same watch glass until it ceased to lose weight under the same conditions, and it was found that the residue weighed 16 per cent. of the weight of the menstruum. This was an unexpected result, for as the menstruum contained 20 per cent. of its weight of glycerin, it was to be expected that upon evaporation very nearly this proportion would remain on the watch glass. Therefore the trial was three times repeated, and the mean of the trials was within a very small fraction of 16 per cent., showing that about 4 per cent. of the glycerin went off with the alcohol and water. This gave the remaining element for closely approximating the extract in each fraction by the following formulas. As the weight of the cubic centimeter taken from each fraction of percolate is to the weight of the residue after evaporation, so is the weight of the entire fraction to the weight of the residue it would leave on evaporation. But had this fraction been menstruum instead of percolate, and been evaporated under the same conditions, it would have given 16 per cent. of its weight of glycerin as a residue. It was therefore assumed (though of course not correctly) that 16 per cent. of the entire fraction was glycerin. Then 16 per cent. of the weight of each fraction was taken and this amount was subtracted from the calculated residue of the fraction, and the remainder was assumed as dry extract of cinchona. Next, as these fractions were not uniform in weight, the assumed extract did not represent a uniform proportion and rate of exhaustion. To show this rate of exhaustion better, a second proportion was made to represent it by percentage. As the total weight of the fraction is to the weight of extract obtained from it, so is 100 to the percentage of extract it contained. For example: The first fraction of the table weighed 62.72 grams. One cc. of this fraction weighed 1.062 grams. This, dried on a watch glass, gave a residue weighing .488 gram. Then, as 1.062 : .488 : : 62.72 : 28.82. But this 62.72 grams is assumed to give 16 per cent. of its weight of glycerin which does not go off by evaporation or (as 100 : 16 : : 62.72 :) 10.04 grams glycerin : and 28.82 residue less 10.04 glycerin leaves 18.78 as the approxinate dry extract contained in the fraction of 62.72 grams of percolate. Then if 62.72 percolate give 18.78 extract, 100 percolate would give 29.9 extract, equal the percentage of extract contained in the fraction of percolate.

The remaining column of the table gives the difference in specific gravity at similar temperatures, between the menstruum and the various fractions of the percolates, and this also illustrates the rate of exhaustion, but in a way much easier of application in practice than that of weighing the extract.

The packing of percolators will vary, even with the greatest care and skill that can be applied, and such variations can never be known without some such investigation and record as given in these tables.

Such variations are commonly the result of too tight packing, so that some portion of the mass is so compact as to make the progress of the liquid through it slower than through other parts, and thus by its slower exhaustion the extract from it is added to the weaker liquor from other parts all the way along through the percolation instead of at the beginning, as is well illustrated in the fourth and fifth percolations of the table, where the percolators were packed too tightly.

REPERCOLATION OF CINCHONA: MENSTRUUM—STRONGER ALCOHOL 2, WATER 2, GLYCERIN 1. SP. GR., .9728 AT 20°C.

Portions of Percolate of about 2 ozs.=56.7 grams each.	First Percolation.				Second Percolation.				Third Percolation.				Fourth Percolation.				Fifth Percolation.				Sixth Percolation.			
	Grams.				Grams.				Grams.				Grams.				Grams.				Grams.			
	Weight of Portions of Percolate.	Weight of Dry Extract.	Percentage of Dry Extract.	Difference in Specific Gravity.	Weight of Portions of Percolate.	Weight of Dry Extract.	Percentage of Dry Extract.	Difference in Specific Gravity.	Weight of Portions of Percolate.	Weight of Dry Extract.	Percentage of Dry Extract.	Difference in Specific Gravity.	Weight of Portions of Percolate.	Weight of Dry Extract.	Percentage of Dry Extract.	Difference in Specific Gravity.	Weight of Portions of Percolate.	Weight of Dry Extract.	Percentage of Dry Extract.	Difference in Specific Gravity.	Weight of Portions of Percolate.	Weight of Dry Extract.	Percentage of Dry Extract.	Difference in Specific Gravity.
1st Portion	62.72	18.78	29.9	.1312	60.51	17.09	28.2	.1160	62.41	20.23	32.4	.1468	62.41	19.50	31.2	.1484	51.06	17.76	34.8	.1640				
2d "	59.85	16.09	26.9	.1112	55.76	17.99	32.3	.1292	56.24	14.07	25.0	.1180	58.61	15.46	26.4	.1300	63.06	22.57	35.8	.1684				
3d "	57.63	13.54	23.5	.0960	60.48	18.53	30.6	.1244	59.20	10.93	18.5	.0908	57.63	11.25	19.5	.1000	63.68	19.82	31.1	.1536				
4th "	58.62	11.97	20.4	.0836	58.57	12.70	21.7	.0912	62.49	13.06	20.9	.0984	48.15	8.68	18.0	.0900	51.55	14.16	27.5	.1324	228.32	63.85	28.0	.1560
5th "	78.30	14.59	18.6	.0708	57.68	6.69	11.6	.0612	56.30	8.74	15.5	.0716	60.52	10.42	17.0	.0824	64.46	14.50	22.5	.1080				
6th "	57.88	6.83	11.8	.0388	56.84	5.97	10.5	.0494	56.51	7.10	12.6	.0548	58.17	8.18	14.1	.0696	61.12	16.47	26.9	.1344	134.52	28.77	21.4	.1244
7th "	50.74	4.80	9.5	.0220	51.82	5.46	10.5	.0512	59.92	6.85	11.4	.0564	52.28	6.77	12.9	.0612	54.74	10.03	18.3	.0944				
8th "	64.06	4.71	7.4	.0132	51.45	2.96	5.8	.0328	59.53	5.62	9.4	.0440	55.70	6.97	12.5	.0596	61.09	8.71	14.3	.0748	114.19	18.38	16.1	.0812
9th "	70.27	5.50	7.8	.0092	50 89	2.39	4.7	.0276	68.68	7.39	10.8	.0368	54.24	5.99	11.0	.0516	58.79	7.27	12.4	.0636				
10th "	65.00	1.35	2.1	.0072	47.08	4.29	9.1	.0416	60.33	5.36	8.9	.0344	61.91	6.81	11.0	.0494	59.54	5.87	9.9	.0532	120.30	21.79	18.1	.0808
11th "	57.97	.79	1.4	.0040	56.38	4.04	7.2	.0304	53.76	4.11	7.6	.0376	60.57	6.78	11.2	.0480	59.02	5.09	8.6	.0448				
12th "	56.30			.0024	55.55	2.11	3.8	.0182	57.93	2.55	4.4	.0324	56.85	6.47	11.4	.0472	58.17	6.54	11.2	.0424	108.61	11.42	10.5	.0472
13th "	51.94	.79	1.5	.0024	52.48	1.51	2.9	.0156	92.00	2.72	3.0	.0252	61.17	7.02	11.4	.0428	57.92	5.41	10.1	.0400				
14th "					56.60	1.78	3.1	.0176	61.34	2.72	4.4	.0236	62.35	5.88	9.4	.0394	63.48	6.46	10.2	.0356	122.68	12.53	10.2	.0420
15th "					56.43	1.22	2.2	.0148	58.42	2.18	3.7	.0200	58.67	3.78	6.4	.0376	63.34	5.44	8.6	.0324				
16th "					53.50	1.10	2.0	.0168	53.45	1.76	3.3	.0230	56.17	4.14	7.4	.0360	57.92	4.35	7.5	.0284	117.56	5.51	4.7	.0260
17th "					57.90	2.25	3.9	.0168	48.75	1.46	3.0	.0244	60.12	3.04	5.1	.0332	58.32	4.43	7.6	.0264				
18th "					55.24	2.67	4.8	.0156	65.36	3.34	5.1	.0304	64.82	3.59	5.5	.0280	65.39	3.75	5.7	.0212	119.79	3.43	2.9	.0200
19th "					68.22	2.78	4.1	.0152	66.56	2.32	3.5	.0156	53.92	1.88	3.5	.0240	59.91	3.46	5.8	.0188				
20th "					86.88	2.49	2.9	.0092	65.24	1.91	2.9	.0116	55.06	1.14	2.1	.0208	60.20	4.17	6.9	.0180	122.59	.62	.5	.0196
21st "									51 99	.56	1.1	.0096	79.45	2.49	3.1	.0176	61.95	3.08	4.9	.0172				
22d "									54.91	.91	1.7	.0072	63.58	.75	1.2	.0162	71.65	3.36	4.7	.0148	102.30			.0200
23d "									72.44	1.40	1.9	.0052	61.52			.0124	74.81	.45	.6	.0128				
24th "									70.40	1.30	1.8	.0076	63.58			.0108	59.07			.0132				
25th "									46.49	.54	1.2	.0046	57.27	.99	1.7	.0104								
Total	791.28	99.74			1150.26	116.02			1520.65	129 13			1484.72	147.98			1455.54	193.15			1290.86	166.30		
Reserved Extract		48.41				66.31				58.29				54.89				74.31				63.85		
Extract carried forward		51.33				49.71				70.84				93.09				118.84				102.45		
Actual Extract obtained		99.74				64.69				79.42				77.14				100.06				47.46		

In interpreting the results of this table the disturbing effect of the trials of different degrees of moistening and different length of maceration, must be borne in mind as largely concerned in the discordant results. But this discordance fairly shows first the necessity for careful investigations and trials, since otherwise the discords would have escaped observation; and next shows the certainty with which each operation tends to control and correct the results of the preceding one until uniformity be reached. The residues in the percolators were critically examined by tasting, and in none was the exhaustion absolute. As the percolators were emptied the upper eighth would be tasteless as a rule; then the bitter taste would be perceptible and would gradually increase to the bottom. At three-fourths down it would be very decided, and the remaining fourth would be pretty strongly bitter. The different percolations were only moderately uniform among themselves, and the want of uniformity was mainly in the lower third of the residue. But the residues were much more uniform among themselves than were the proportions of extract obtained, and all were fairly exhausted. The first and sixth percolations gave the most thoroughly exhausted residues, and yet the extract obtained, as shown by the table, was about two to one. This shows in a striking way that the extractive matter is not a measure of the exhaustion as judged by the bitterness of the residue. Therefore in using the quantity of extract as a guide to exhaustion, if the quality of the extract be not ascertained the condition of the residue must be used as a check upon the extract as a guide.

The general result, however, as shown by even a glance at the table—a result that could be obtained in no other way—though favorable to repercolation, is unexpectedly unfavorable to the menstruum used because of the overloading and masking effect of the excess of soluble extractive matter in this exceptionally rich, soft, soluble bark. Therefore another percolation—the seventh of this series—was made with another grade of cinchona, using the same weak percolates and menstruum. This cinchona was the poorest in the writer's possession. It is from the C. officinalis cultivated in Ceylon, and contains between 4 and 5 per cent. of total alkaloids, of which about three-fourths is quinia. Therefore though still much richer than the U. S. P. yellow cinchona it is much nearer to it than the Java cinchona is. This 8 ounces = 226.7 grams of the new powder was as well exhausted as the other percolations with 1136.33 grams of percolate in 5 portions of about 8 ounces = 226.7 grams each. These portions, by the same calculations, yielded respectively 59.85, 37.26, 22.16, 7.15, and 2.77 grams = 129.19 grams of extract. Of this 102.45 grams was carried forward to it in weak percolates from the sixth percolation of the table. The 8 ounces = 226.7 grams reserved contained 59.85 grams of extract, leaving 4 portions of weak percolate to be carried forward containing (129.19 — 59.85 =) 69.34 grams of extract. But the extract which appears to have been obtained by this percolation is only (129.19 — 102.45 =) 26.74 grams, and yet the powder was about as well exhausted as any of the previous percolations, and the weak percolates carried forward were much less loaded with extractive.

This improvement of the process by the use of a less exceptional quality of cinchona was however still evidently insufficient, and left it still short of the best results. The menstruum was next to be changed, as it plainly needed more alcohol to exclude some of the extract, and probably less glycerin.

A new menstruum was made consisting of 5 parts stronger alcohol, 4 parts water, and 1 part glycerin. The sp. gr. of this mixture was .9575 at 15.6° C. = 60° F., or .9496 at 25° C. = 77° F. A cubic centimeter of this menstruum carefully weighed and evaporated on a watch glass left 7.75 per cent. of glycerin not evaporable at the temperature to which the fractions of percolate were submitted. A new series of percolations was started with this menstruum, and was conducted precisely as with the former series. The first two percolations were made with the rich Java cinchona so as to compare the results of the two menstrua upon the same powder. The remainder were made with the Ceylon powder and new menstruum. In this series the percolate was divided into portions of 8 ounces = 226.7 grams each except the first portion of the first percolation, which was 6 ounces = 170.1 grams, and the powder in each was moistened with 8 ounces = 226.7 grams of menstruum or weak percolate. So moistened it could not have been passed through the sieve at once, but by standing for the prescribed 8 hours in a closely covered vessel the liquid was absorbed by the powder, and then it was easily passed through the sieve. When moistened to this extent the powder must not be firmly packed, and it is quite important to use the largest practicable quantity of liquid to moisten the powder in repercolation. The results of these percolations are given in the following table.

REPERCOLATION OF CINCHONA.—MENSTRUUM 5, 4, AND 1, SP. GR. .954 AT 20° C. = 68° F.

8 Avoirdupois ounces = 226.7 *grams, of Powder for each Percolation. Total Percolates in 4th, 5th, 6th, and 7th Percolations, each* 1586.9 *grams.*

Portions of Percolate of about 8 ounces = 226.7 grams each. The 4th, 5th, 6th, and 7th Percolations were made exactly 226.7 grams each.	JAVA CINCHONA.								CEYLON CINCHONA.																
	First Percolation.				Second Percolation.				Third Percolation.				Fourth Percolation.			Fifth Percolation.			Sixth Percolation.			Seventh Percolation.		
	Grams.				Grams.				Grams.															
	Weight of Portions of Percolate.	Weight of Dry Extract.	Percentage of Dry Extract.	Difference in Specific Gravity.	Weight of Portions of Percolate.	Weight of Dry Extract.	Percentage of Dry Extract.	Difference in Specific Gravity.	Weight of Portions of Percolate.	Weight of Dry Extract.	Percentage of Dry Extract.	Difference in Specific Gravity.	Weight of Dry Extract.	Percentage of Dry Extract.	Difference in Specific Gravity.	Weight of Dry Extract.	Percentage of Dry Extract.	Difference in Specific Gravity.	Weight of Dry Extract.	Percentage of Dry Extract.	Difference in Specific Gravity.	Weight of Dry Extract.	Percentage of Dry Extract.	Difference in Specific Gravity.
1st portion......	170.20	48.44	28.4	.1264	226.93	74.77	32.9	.1384	226.84	58.18	25.7	.1048	71.05	31.3	.1428	73.67	32.5	.1516	73.85	32.6	.1636	73.03	32.2	.1598
2d “	226.80	31.42	13.9	.0672	227.00	45.31	20.0	.0880	227.11	28.00	12.3	.0480	47.43	20.9	.0936	52.71	23.3	.1076	52.90	23.3	.1184	50.14	22.1	.1080
3d “	226.75	8.02	3.1	.0102	226.85	5.95	2.7	.0180	226.80	17.94	7.9	.0340	25.16	11.1	.0388	23.02	10.2	.0460	20.96	9.2	.0520	26.38	11.7	.0590
4th “	206.17	2.96	1.4	.0052	226 78	3.88	1.8	.0092	227.00	15.35	6.8	.0268	20.60	9.1	.0232	9.60	4.2	.0208	8.04	3.5	.0184	11.11	4.9	.0210
5th “	114.61	.37	.3	.0060	226.83	2.60	1.1	.0124	226.91	8.84	3.9	.0192	6.80	3.0	.0100	7.31	3.2	.0092	8.70	3.8	.0036	16.38	4.5	.0208
6th “	......	......	......	......	......	......	......	......	226.70	2.33	1.0	.0140	5.26	2.3	.0036	2.62	1.2	.0008	1.40	.6	minus.	4.50	2.0	.0092
7th “	......	......	......	......	......	......	......	......	226.82	1.29	.5	.0090	1.14	.5	.0020	1.53	.7	.0006	.37	.2	minus.	.60	.3	minus.
Total......	944.53	91.21	......	......	1134.39	132.51	......	......	1588.18	131.93	......	......	177.44	......	......	170.46	......	......	166.22	......	......	176.14	......	......
Reserved Ext...	......	48.44	......	......	......	74.77	......	......	......	58.18	......	......	71.05	......	......	73.67	......	......	73.85	......	......	73.03	......	......
Extract carried forward......	......	42.77	......	......	......	57.74	......	......	......	73.75	......	......	106.39	......	......	96.79	......	......	92.37	......	......	103.11	......	......
Actual extract obtained......	......	91.21	......	......	......	89.74	......	......	......	74.19	......	......	103.69	......	......	64.07	......	......	69.43	......	......	83.77	......	......

This table fairly represents the application of the formula and process given at page 715 in all the details, and the actual practice of repercolation, only that the results are imperfectly examined and recorded here, for illustration by means of the table; and the table is presented as a model upon which every individual fluid extract should be studied. The weighings and measurings are not chemically nor critically accurate, nor is the basis of calculations mathematically correct. And when differences of specific gravity are given to the fourth decimal place, the reader must not accept them, or any of the figures as having anything like the extreme degree of precision which would be indicated by such figures. The weighings in all the tables were made to the nearest centigram, and the specific gravities were all taken in a rather rudely made 25-gram flask, without corrections for temperatures, and the four decimal places come from multiplying the weights obtained with this flask in centigrams by 4. Hence these differences of sp. gr. although put down with the apparent accuracy of four decimal places are really the least accurate of all the determinations of the tables. In short the whole results should be taken as being only close and useful approximations, and such as most pharmacists could easily make. This table being the last of all, and not half completed when the paper had to be sent to the Amer. Journ. of Pharmacy for publication, embraces the experience and skill acquired in making the others, and its better results are therefore partly due, no doubt, to the dexterity obtained by a few months of personal practice on this small scale of working. It therefore may be accepted as representing good ordinary practice with repercolation as applied to one of the most difficult substances known, on the lowest scale of quantity likely to be needed by the pharmacist, and the fluid extract yielded seems to be of unexceptionable quality in every respect, both in sensible properties and when applied therapeutically in two cases. It is unfortunate that the presence of glycerin not only prevents the precipitation of alkaloids by ammonia, but also entirely invalidates the thalleioquin test as applied to the percolates; and that no test was found whereby to judge of the quantity of alkaloids in the different percolates better than by mere taste and color. The final percolates were always very decidedly bitter, and never paler than a dark sherry color even when yielding not over one-tenth of one per cent. of total extract. Two very curious apparent results in the table are well worthy of farther and more accurate observation. First, that the quantity of extract obtained from the different percolations as measured by that of the first simple percolation with new menstruum is in the aggregate over 100 per cent., while the exhaustions are apparently not so good as the first. The other result, which leads in the same direction, is that the difference between the sp. gr. of the menstruum, and the sp. gr. of the weaker percolates diminishes more rapidly than it should do, and finally gets to be a minus quantity, which *a priori* should be impossible. All this leads to an inference that the residue left behind in the percolator splits up the menstruum, and holds on to more of the water or more of the glycerin, or more of both, than it does of the alcohol.

This table again illustrates the disturbing effects of insensible variations in the packing of percolators, and how by repercolation such variations are so controlled as to give fairly uniform results in practice.

It remains now to give a summary of the results obtained from these two series, as bearing upon the relation between the weight and measure of the reserved portion of each percolation.

FIRST SERIES OF PERCOLATIONS.				SECOND SERIES OF PERCOLATIONS.			
Reserved Portions.	Weight. Grams.	Measure. Cubic Cent.	Difference Per cent.	Reserved Portions.	Weight. Grams.	Measure. Cubic Cent.	Difference Per cent.
1st Percolation......	171.10	158	7.6	1st Percolation......	170.20	158	7.1
2d "	226.80	214	6.0	2d "	226.90	210	7.5
3d "	226.80	210	7.5	3d "	226.80	216	5.0
4th "	226.80	208	8.3	4th "	226.80	208	8.3
5th "	226.80	204	10.1	5th "	226 80	206	9.1
6th "	226.80	201	11.4	6th "	226.80	206	9.1
7th "	226.80	206	9.2	7th "	226.80	211	7.0

It will be seen by this table that the first series gives a relation varying between 89 and 94 minims to each 100 grains of the cinchona; and for the second series gives 90 to 95 minims to the 100 grains as the extreme limits of the series. Either of these is a great improvement upon the results of pharmacopœial practice.

The deductions which the writer draws from the work here given as applicable to the present pharmacopœial practice, and that which may be desired for the future are mainly as follows:

First. That the present formulas and processes for percolation are so defective that the relation to the drug which they profess is not practically accurate either as to quality or quantity, and therefore that a better process is greatly needed.

Second. That the process by repercolation, though it has some grave disadvantages, and is liable to defects in practice, yet gives far better results, both in quality and quantity of product; while it is not difficult in practice except by comparison with the delusive simplicity of the former processes; and therefore that repercolation is better adapted to pharmacopœial use as a model or standard process than any which has yet been tried.

Third. That repercolation may be used on a scale as small as 4 or 8 ounces, by great care and skill, but is not very successful with less than an avoirdupois pound of material for each percolation.

Fourth. That powders for percolation should not be finer than No. 60 for hard compact substances, nor coarser than No. 40 for more loose and spongy substances, with a few special exceptions.

Fifth. That the menstruum should be so adjusted as to dissolve out the medicinal principles with the least practicable disturbance of their natural relations to each other and to the extractive matters whereby they are rendered soluble and permanent. Next, that the menstruum should contain the smallest practicable proportion of alcohol; and glycerin only when absolutely necessary, as in cinchonas. And finally, that the menstruum should be so adjusted that when the fluid extract represents the drug, weight for weight, it should also represent the drug by not less than 90 minims to the 100 grains, or more than 97 minims to the 100 grains, since by repercolation the exhaustion is never less than 90 per cent. and perhaps rarely more than 97 per cent. of the total soluble matter.

Sixth. That the powder be moistened with as much liquid as it can be made to hold and yet pass through a No. 8 sieve; that it be not tightly packed; and that it be well macerated before starting the percolation.

Seventh. That the rate of percolation be uniform and very slow. At first, for the reserved portion, the percolate in 24 hours should not exceed the weight of the powder; nor need the rate be slower than to obtain the weight of the powder in 48 hours, although as a general rule the slower the rate the better the results. After the reserved portion the rate may be increased gradually so that the last portion be received in about 6 hours.

The separate portions of weak percolate should not exceed the weight of the powder.

Eighth. That a good practical exhaustion requires, as a general rule, for the first percolation, with fresh menstruum, that the total percolates should weigh 3.5 times the weight of the powder. That for the second percolation or first percolation, the weight should be 4.5 times that of the powder. And for all subsequent repercolations the weight should be 5, 6, or 7 times that of the powder, according to the nature of the substance percolated, and the skill and care with which the process is managed.

Ninth. That the relation of weight for weight, instead of minim for grain, should be established under proper controlling conditions. But that unless properly guarded in the quality and moisture of the drug used, the new relation is liable to be even more inaccurate than the old, because the poorer the quality of the drug the less dense will be the percolates, and the greater will be the volume for the prescribed weight; and this involves the serious difficulty that when the fluid extract is made by weight but administered by measure, the poorer the drug from which it was made the smaller, as well as the weaker, the dose will be.

Tenth. That some good practical method of comparing fluid extracts by a standard is very much needed; and that for such drugs as cinchona, a method of arithmetical dilution would be easy and practical if well worked out.

Whilst the above-mentioned work on cinchona was in progress a paper by Mr. J. U. Lloyd, of Cincinnati, appeared in the *American Journal of Pharmacy*, for 1878, p. 1, upon Fluid Extract of Cimicifuga. This paper contains so many valuable observations, made without bias, and with such care and labor as at once to command attention. The results, however, were in many important respects so at variance with those of the previous experience of this writer as to force upon him the conclusion that Mr. Lloyd might have misinterpreted some of his observations; and if so it was important that his work should be gone over in the light of the many useful suggestions it contains for those who might follow him. It is regretted that he did not refer to later papers on the subject of percolation and repercolation, or at least did not adopt some important modifications that are published in later papers.

His work upon cimicifuga has been repeated by precisely the same method as given above for cinchona, that is, in accordance with the later experience on percolation and repercolation, and the results are given. Those who will compare these results with those of Mr. Llyod will find important discrepancies which must belong to one set of observations or the other. On one important point Mr. Lloyd must reach a wrong conclusion, for it certainly can be demonstrated, upon well-known physical laws, that maceration to a proper extent is useful and necessary to other conditions of the problem. This point is so well established by general experience that this part of his work was not gone over. The formula and process adopted here were as follows:

Take of cimicifuga, in powder No. 60, ... 32 parts.
Stronger alcohol, s. g. .819 at 15.6° C. (= 60° F.),
or s. g .811 at 25° C. (= 77° F.), a sufficient quantity.

Moisten 8 parts of the cimicifuga with 2 parts of the alcohol, and pack it firmly in a percolator. Then pour alcohol on top until the moist powder is thoroughly filled with liquid and the air is forced out, cover the percolator and macerate for 48 hours. Then arrange the percolation for an automatic supply of menstruum, and start the percolation at such a rate as to give about 1 part of percolate every 3 hours. Reserve the first 6 parts of percolate, and continue the percolation to practical exhaustion, receiving the weaker percolate in separate portions of about 4 parts each.

Then moisten a second portion of 8 parts of the cimicifuga with 2 parts of the second percolate from the first portion of powder, pack it firmly in a percolator, and supply it on top, first with the remaining 2 parts of the second percolate from the first portion, and then with the successive weak percolates in the order in which they were obtained, until the moist powder is entirely filled with liquid. Then macerate for 48 hours, and percolate to practical exhaustion at the same rate as in the first portion of the cimicifuga, using first the weak percolates in their proper order, and then fresh menstruum. Reserve the first 8 parts of percolate, and receive the weak percolate in separate portions of about 4 parts each.

Then moisten a third portion of 8 parts of the cimicifuga with 2 parts of the second percolate from the second portion of the cimicifuga, and conduct the percolation in exactly the same manner as in the second portion, reserving the first 8 parts of percolate.

Then moisten the remaining 8 parts of the cimicifuga for a fourth percolation, and conduct it in exactly the same manner as the second and third portions.

Mix the four reserved percolates, weighing 30 parts, and set it by as finished fluid extract of cimicifuga; and having properly labelled and numbered the separate portions of weak percolate, set these by until the process for making this preparation is to be resumed; and then use them exactly as in the second, third, and fourth percolations, reserving 8 parts of the first percolate from each 8 parts of powder as the finished fluid extract, ever after, and setting aside the weak percolates from each operation to be used in the next succeeding one.

In applying this formula and process each part was represented by a troy ounce, and therefore the percolations were made with 8 troy ounces of powder each. For the purposes of this trial the percolate was separated in portions of about 2 troy ounces or 62 grams each, instead of 4 troy ounces as indicated in the process, and each separate portion was carefully weighed. A cubic centimeter of each portion of percolate was carefully weighed on a flat watch-glass, and then dried and the dry extract weighed. Then a proportion was made by calculation from these data to find the total dry extract in each portion of the percolate, this proportion being as follows: As the weight of the cc. of percolate is to the weight of dry extract which it yielded, so is the whole portion of the percolate to the dry extract it contains. Having thus obtained the total dry extract contained in each portion of percolate, the sum of these would be the total extract of all the portions. But as these portions varied in weight the series would not represent the rate of exhaustion. Therefore another proportion was made to show the rate or progress of exhaustion by the percentage of dry extract contained in each portion of percolate. The formula for this proportion is as follows: As the weight of the portion of percolate is to the weight of dry extract which it contains, so is 100 to the percentage of the dry extract contained in the portion of percolate. The difference of specific gravity between the menstruum and the percolate, which also shows the rate of exhaustion, was obtained by a small sp. gr. flask.

The following table gives the detail of these observations in compact form, but, as it was found by examination of the residue that the strong alcohol did not fully exhaust the cimicifuga, the percolations were only carried as far as the third, at which point it was determined to try a new menstruum, in another process.

CIMICIFUGA, WITH STRONGER ALCOHOL.

Portions of Percolate.	First Percolation.				Second Percolation.				Third Percolation.			
	Grams.				Grams.				Grams.			
	Weight of Portion of Percolate.	Weight of Dry Extract.	Per cent. of Dry Extract.	Difference of Sp. gr.	Weight of Portion of Percolate.	Weight of Dry Extract.	Per cent. of Dry Extract.	Difference of Sp. gr.	Weight of Portion of Percolate.	Weight of Dry Extract.	Per cent. of Dry Extract.	Difference of sp. gr.
1st	62.20	7.78	12.51	.0444	63.41	12.15	19.16	.0636	61.22	10.98	17.93	.0556
2d	65.35	6.25	9.56	.0330	64.23	8.08	12.58	.0440	66 35	8.53	12.86	.0476
3d	64.51	4 84	7.50	.0264	63.12	6.82	10.80	.0328	64 30	6.97	10.84	.0372
4th	63.03	3.36	5 33	.0232	62.54	4.22	6.74	.0240	55.00	4.79	8.71	.0352
5th	61.22	2.30	3.75	.0184	61.65	3.54	5.74	.0204	62.00	4.32	6.97	.0272
6th	60.24	1.69	2.80	.0140	62.36	2.90	4.65	.0164	62.22	3.38	5.43	.0224
7th	61.00	1.30	2.13	.0116	63.11	2.63	4.17	.0128	63.34	2.76	4.36	.0184
8th	60.02	1.29	2.15	.0108	63.41	2.21	3.49	.0104	62.24	2.51	4.03	.0148
9th	65.37	1.11	1.70	.0096	62.12	1.76	2.83	.0068	62.56	2.18	3.48	.0124
10th	61.86	1.11	1.79	.0028	62.32	1.53	2.46	.0044	63.06	1.98	3.12	.0096
11th	112.52	.91	.81	.0036	62.24	1.39	2.23	.0060	64.02	1.80	2.81	.0100
12th	108.01	1.25	1.16	.0016	63.33	1.16	1.83	.0044	63.44	1.68	2.65	.0100
13th	....	....	....	....	80.01	1.77	2.21	.0060	62.32	1.20	1.92	.0082
14th	....	....	....	....	98.00	1.90	1.94	.0052	66.80	.90	1.35	.0018
Totals	845.33	33.19	....	....	931.85	52.06	....	....	878.87	53.98	....	....
Reserved Extract	....	18.87	....	....	....	31.27	....	....	....	31.27	....	....
Extract carried forward	....	14.32	....	....	....	20.79	....	....	....	22.71	....	....
Extract from each Percolation	....	33.19	....	....	....	37.74	....	....	....	33 19	....	....

The first percolation of the table being simply a percolation with fresh menstruum to practical exhaustion, serves to compare and check the other percolations in their results. The 8 troy ounces of cimicifuga = 248.8 grams required 845.33 grams of percolate for practical exhaustion, though this was short of actual exhaustion. The total percolate is therefore nearly three and a half times the weight of the powder, and is as little as will give a practical exhaustion to this drug with this menstruum. This is more than double the proportion of the officinal U. S. P. formula, and accounts for a part of the defects of the officinal preparation. The extract obtained for this first percolation of the table is 33.19 grams or (248.8 : 33.19 : : 100 :) 13.34 per cent. of the weight of the powder. Then as these percolations were made by repercolation, the total extract should be (33.19 × 3 =) 99.57 grams. But the total obtained (33.19 + 37.74 + 33.19 =), 104.12 grams, slightly exceeds this, showing that the total exhaustion was rather better than the first of the series.

Now if the total extract to be expected from the 24 troy ounces = 746.4 grams of powder be 99.57 grams, and as the finished fluid extract is to weigh only (6 + 8 + 8 =) 22 troy ounces = 684.2 grams, then the extract which should be contained in the reserved portions which constitute the finished fluid extract should be (as 746.4 : 99.57 : : 684.2 :) 91.27. But really the total extract in these reserves is only (18.87 + 31.27 + 31.27 =) 81.41 grams, or 10.16 grams less than it should be. This deficit is mainly due to the process having been stopped at the third percolation instead of being carried on to include the fourth. In order that the fluid extract should represent the drug, grain for grain, or weight for weight, if the extract was all of equal medicinal value, the reserved percolates should weigh 186.6 + 248.8 + 248.8 grams, and should contain 24.9 + 33.19 + 33.19 grams. This fluid extract, to have represented the drug in the relation of minim for grain should have measured (177.12 + 236.16 + 236.16 =) 649.44 cc., but it really measured 676 cc., and therefore the minim did not represent the grain ($\frac{649}{676}$) though the preparation is much stronger than the officinal one which purports to have this relation.

To endeavor to remedy the apparent defects of this process and make a preparation which shall more nearly represent the entire drug, another set of repercolations was made with a new menstruum. As the officinal menstruum, namely, stronger alcohol, did not fully exhaust the drug, and separated out the resinous portions from their natural associates and solvents in the drug, the attempt was made to go to the other extreme and try a solvent or menstruum which should contain perhaps too little alcohol, and if so, yield a preparation overloaded with extractive matter, so that by comparing the results of the extremes, a better menstruum than either extreme might be found. With this object the new menstruum was made of equal parts (by weight) of stronger alcohol sp. gr. .819 at 15.6° C. (= 60° F.), or .811 at 25° C. (= 77° F.) and water. This mixture required 26.5 f℥ of water to 2 pints of stronger alcohol. The sp. gr. of this mixture is .926 at 15.6° C. (= 60° F.), or .919 at 25° C. (= 77° F.), or .9236 at the room temperature at which the weighings were made.

The same formula and process were used as in the first repercolations of cimicifuga, with the exception of the menstruum, and the powder was from the same stock, and used on the same scale of a troy ounce = 31.1 grams for each part, and therefore 8 troy ounces = 248.8 grams of powder for each percolation; and in this case the whole four percolations were made. The following table gives the results of this repercolation, and contains the same ele-

CIMICIFUGA WITH NEW MENSTRUUM.

Portions of Percolate.	First Percolation.				Second Percolation.				Third Percolation.				Fourth Percolation.			
	Grams.		Per cent. of Dry Extract.	Difference of sp. gr.	Grams.		Per cent. of Dry Extract.	Difference of sp. gr.	Grams.		Per cent. of Dry Extract.	Difference of sp. gr.	Grams.		Per cent. of Dry Extract.	Difference of sp. gr.
	Weight of Portion of Percolate.	Weight of Dry Extract.			Weight of Portion of Percolate.	Weight of Dry Extract.			Weight of Portion of Percolate.	Weight of Dry Extract.			Weight of Portion of Percolate.	Weight of Dry Extract.		
1st	69.18	23.55	34.04	.1212	67.78	22.56	33.29	.1104	64.67	16.89	26.12	.0948	67.55	24.53	36.31	.1324
2d	70.72	19.45	27.50	.0944	64.59	15.65	24.23	.0824	64.22	14.58	22.70	.0808	65.07	21.10	32.58	.1148
3d	66.88	13.27	19.70	.0716	65.07	15.14	23.27	.0800	66.17	13.13	19.84	.0728	57.92	15.28	26.38	.0928
4th	64.34	9.72	15.10	.0548	69.16	14.08	20.36	.0700	66.67	11.62	16.00	.0636	58.70	13.06	22.25	.0820
5th	64.55	7.12	11.03	.0408	76.12	12.26	16.11	.0556	65.90	9.85	14.95	.0536	53.34	7.22	13.54	.0684
6th	62.34	4.48	7.18	.0312	63.73	7.92	12.43	.0452	60.43	7.45	12.33	.0432	60.49	9.25	15.29	.0560
7th	62.31	3.19	5.12	.0248	65.14	6.25	9.58	.0372	90.10	8.63	9.05	.0344	65 63	8.24	12.55	.0480
8th	83.27	2.52	3.03	.0160	64.50	5.98	9.27	.0348	56.89	4.40	7.73	.0284	58.34	6.84	11.72	.0452
9th	107.89	.93	.86	.0080	88.97	5.21	5.85	.0244	69.75	5.25	7.53	.0268	66.83	7.36	11.01	.0436
10th	56.52	.46	.81	.0072	65 03	2.35	3.61	.0176	53.83	3.61	6.77	.0248	65.17	6.03	9.25	.0384
11th	65.64	.18	.27	.0096	64.43	1.70	2.64	.0138	62.49	3.36	5.38	.0176	59.91	6.05	10.09	.0364
12th	63.91	.03	....	.0014	64.43	1.49	2.31	.0118	63.66	4.17	6.55	.0216	63.99	5.21	8.14	.0332
13th	121.02	.06	....	.0056	63.94	1.54	2.41	.0086	54.35	2.67	4.91	.0168	63.68	4.51	7.08	.0250
14th	....	....	....	....	63.94	1.10	1.72	.0066	112.57	5.88	5.22	.0196	61.60	3.43	5.57	.0296
15th	....	....	....	....	63.80	1.01	1.51	.0038	63.57	3.00	4.72	.0172	59.70	2.97	4.98	.0204
16th	....	....	....	....	39.59	.68	1.70	.0026	63.57	1.99	3.13	.0172	67.13	2.19	3.26	.0132
17th	....	....	....	....	....	....	....	....	89.14	2.90	3.25	.0156	63.10	1.05	1.66	.0108
18th	....	....	....	....	....	....	....	....	....	....	....	....	61.86	.99	1.60	.0064
19th	....	....	....	....	....	....	....	....	....	....	....	....	100.86	1.14	1.13	.0032
20th	....	....	....	....	....	....	....	....	....	....	....	....	67.11	.58	.86	.0040
Total	958.57	84.96	....	....	1050.22	114.92	....	....	1167.98	119.41	....	....	1287.98	147.03	....	....
Reserved Ext.	....	56.27	....	....	....	67.43	....	....	....	56.22	....	....	....	73.97	....	....
Extract carried forward	....	28.69	....	....	....	47.49	....	....	....	63.19	....	....	....	73.06	....	....
Ext. from each Percolation	....	84.96	....	....	....	86.23	....	....	....	71.92	....	....	....	73.84	....	....

ments obtained in the same way, but the first percolation attained a much more thorough exhaustion, while the subsequent ones were not carried so far on account of the apparent inertness of the extractive matter obtained. The third percolation was much less successful than the others in consequence of too short a maceration. This carried too much of the extract forward by the weak percolates into the fourth percolation, and overloaded it. But this serves as an excellent example of the way in which the errors of one percolation are corrected by those which follow when repercolation is used.

The first percolation of 8 troy ounces (=248.8 grams) required a total percolate of 958.57 grams for exhaustion, or nearly 4 times the weight of the powder, and gave 84.96 grams of extract, which is 34.14 per cent. of the weight of the powder. The 32 troy ounces (=995.33 grams) of powder should therefore give (84.96×4 =) 339.84 grams of extract. But when the extract actually obtained from the four percolations is summed up, it is found to be only (84.96+86.23+71.92+73.84=) 316.95 grams, or 22.89 grams less than the indicated quantity. This is, therefore, an apparent loss of (as 995.33 : 316.95 : : 100 : 31.84, and 34.14—31.84=) 2.3 per cent., which considering the apparent quality of final extracts in repercolation, is quite unimportant, at least in view of the far greater deficiencies of the officinal processes, or any modification of them hitherto used.

Now if each troy ounce of powder is to be represented by a troy ounce of the fluid extract, and the fluid extract be adjusted to the solid extract obtained, then the reserved percolates should weigh, respectively, 186.6, 248.8, 248.8, and 248.8 grams, and should contain 59.41, 79.22, 79.22, and 79.22 grams of extract. But by the table the reserves weigh 206.78, 266.60, 261.73, and 249.24, and contain 56.27, 67.43, 56.22, and 73.97, thus making a very imperfect exhibit, though still far ahead of the present or past officinal processes. The conditions being new, each percolation was varied in management in order to reach the best method. This was not reached until the fourth percolation, and one or two more percolations, using much more liquid to moisten the powder, would have been needed to obtain greater precision and uniformity. The total finished fluid extract, which should represent 30 troy ounces (=933 grams of the drug), when made to bear the relation of minim for grain, weighed 984 grams, and was, therefore, considerably too heavy. This, and the tendency of the percolate to become overloaded with extractive, at the same time that it illustrates the value and appropriateness of the principle of repercolation, also shows that this new menstruum has too little alcohol, and leads to the inference that a menstruum of 2 parts stronger alcohol and 1 part water would be better adapted to cimicifuga than either of the extremes here tried. Such a proportion would, by repercolation, probably yield a fluid extract which, in the proportion of weight for weight, would also have the proportion of minim for grain, or what would represent the drug better because more accurately than by any known method of percolation, including repercolation, namely, 90 to 97 minims for each 100 grains of the drug. In readjusting all fluid extracts, therefore, to bear the relation of weight for weight to the drug, the weight should measure in minims from 90 to 97 minims for every 100 grains, to make the therapeutic value of the minim and grain and of the fluid extract and the drug practically equal. This can be readily done by variations in the menstrua used, but not without the expenditure of much time, skill, and labor, an amount which no individual or committee can afford to give, but which a Pharmacopœia must have in order to be respected as a standard. It may be mentioned in illustration of this point that all the time and labor that the writer could possibly spare, including at least three evenings of every week, for three and a half months, has been given to this paper, which embraces only two fluid extracts, neither of which are yet in the condition they should be for the Pharmacopœia for want of more time and labor.

It now remains to give some account of the mechanical contrivances which, in the hands of the writer, seem best adapted to a uniform and practically good exhaustion of the soluble portions of drugs without the use of heat, so that the fluid extract of the drug shall bear a tolerably definite and uniform relation to the drug of minim for grain and weight for weight, for the writer now believes that both these relations can be had at once with a practical and sufficient degree of accuracy; or with accuracy enough for the present relations of pharmacy to therapeutics. It can hardly be doubted that by a competent knowledge of known physical laws, and by a fair application of this knowledge to the problem, a fluid extract can be made by repercolation, without heat, bearing the proper relation, with great accuracy, but the success or want of success with which this is done will vary much more with the degree of knowledge and skill applied to it, than with any particular form of apparatus used. That is, the measure of success will always be in the application of well-known physical laws. The writer, therefore, desires to guard against any misleading effect of a simplicity that is not intended to be *ad captandum*, for it would be very hurtful to continue in the present to underrate a problem which has been so very much underrated in the past. If the principles involved, and the difficulties of carrying them out, be once fairly comprehended, the mechanical appliances may be easily varied; and yet must still leave some one contrivance as the best until a better be found.

No better form of apparatus has been found by the writer than that which has now been used, upon various scales, during the past twelve years, an account of which was published in 1872, and which is reproduced with improvement and amplification in this paper. To simplify this apparatus with the slightest possible sacrifice of the principles involved, with the object of getting the principles to be better and more generally understood and applied where so much needed, is the object of introducing the modified apparatus shown in the following cut.

The cut presents three separate groups of apparatus in positions to illustrate three stages of repercolation, and it is to be understood that all intermediate positions are often useful and necessary even in the same percolation. The support is a common apparatus stand, the rings of which are reduced to the proper size by short sections of rubber-tubing cut open and placed on the wire of the ring when needed; or, a section of larger tubing stretched over the percolator as in Fig. 3. The percolators are common lamp chimneys, costing about five cents each, and are of the size and form known technically as "A" and "B" "Sun Chimneys." These are of very good form, though not the best—for percolators, and should be selected with as small an opening for the stopper as possible, and with the smoothest, thickest, and most regular edge, since it is practically impossible to stop some of their irregular edges tightly. The smallest size, Fig. 3, holds conveniently 4 ounces of most powders, and the larger holds 8 ounces—to the points shown in the cut. A good soft cork, bored in the centre for a short piece of glass tube of not more than ⅛th of an inch or 3 mm. bore, serves to close the small end of the chimney. A rubber cork is best, and such may be made of concentric sections of rubber tubing of different sizes; or, the largest cork at hand may be increased to the proper size by stretching around it short sections of rubber tubing. The short piece of glass tubing should not go quite through the cork on the inside, and should project about an inch = 25 mm. outside. A piece of rubber tubing of not over $\frac{1}{8}$th inch (= 3 mm.) bore, and about 13 inches (= .325m.) long, as one end slipped on to the glass tube. If this tubing be much larger than the dimensions given it fails to be filled with the liquid, and then, when the percolator is in the position of Fig. 3, it fails to perform the office of a Sprengel pump in exhausting

FIG. 92.

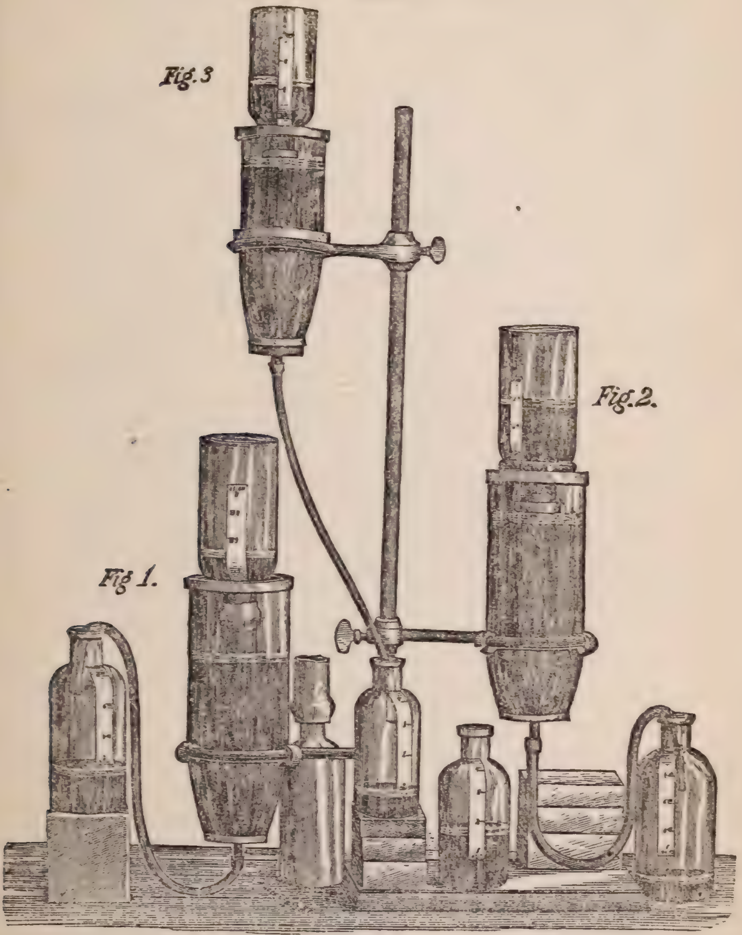


Fig. 3
Fig. 2.
Fig 1.

Scale, one-sixth of the actual linear size.

the liquid and air-bubbles from the lower part of the percolator. Two disks of blanket or thick flannel, and one of filtering-paper, cut a little larger than the inner surface of the cork, and laid upon it, complete the arrangement of the percolator. The powder, moistened with great care and uniformity, is packed loosely, firmly, or very firmly, according to its nature or condition, with the square end of a stick, say .8 inch (= .02m.) diameter. As a rule the largest practicable proportion of liquid should be used in moistening the powder, because then the powder occupies the smallest space in the percolator, requires the loosest packing, and is saturated for the maceration by the smallest additional quantity of liquid, and therefore gives the most concentrated first percolate for the reserve, and secures the most rapid exhaustion by the smallest quantity of liquid. A disk of filtering-paper is placed on the surface of the powder, of such size that the edge is reflected up against the glass. A disk of board, card-board, or, better, of thick sheet rubber, with a central hole 1.5 inches (= .037 m.) in diameter, is used for a cover. A stratum of liquid, maintained at a uniform thickness of .25 inch (= .006m.) should cover the powder from first to last, so that it may not drain and contract, or admit air; and this is best maintained by an inverted bottle of the supply liquid, as shown in the cut. The length of the neck and mouth of such bottle may be conveniently elongated when needed, so as to regulate the depth of the stratum of liquid above the powder, by stretching over it a short section of rubber tubing in the manner shown in the first group of the cut, Fig. 1. When the percolator is charged and ready for maceration the small rubber tube is turned up and fastened with a piece of thread or rubber band, so that the end is considerably above the level of the liquid in the percolator, and in so adjusting it care must be taken not to close the tube, because as the liquid descends through the powder to fill up all the interstices it is important that the interstitial air should have a free exit by the tube.

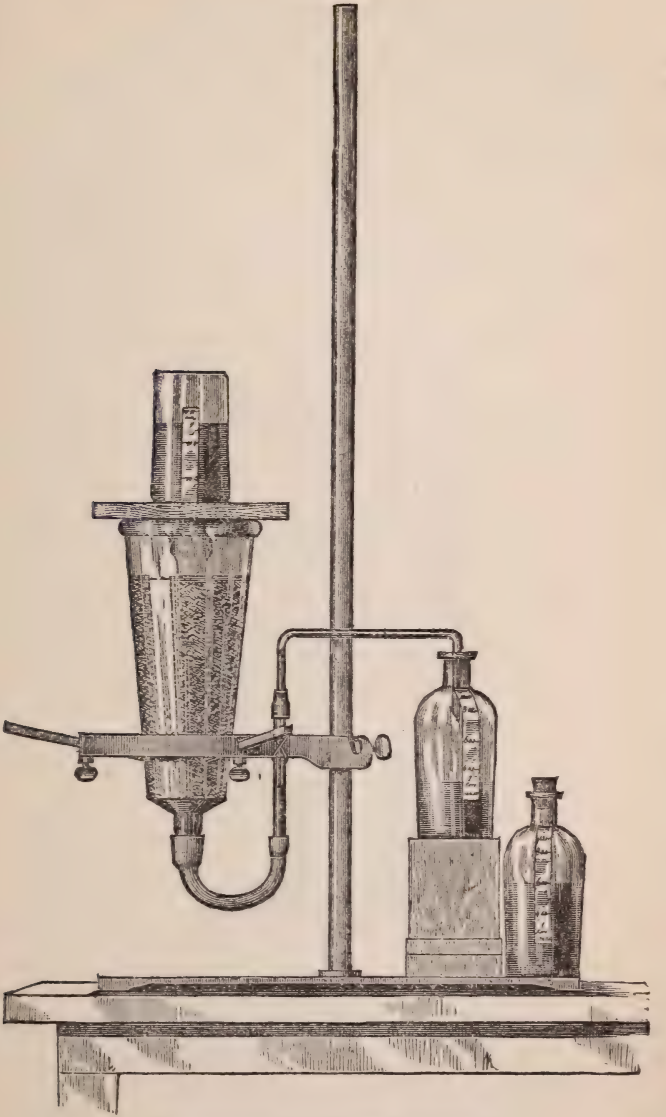
The bottles for receiving the percolate are common round-shouldered prescription bottles, 4 oz. for the small percolator, 8 oz. for the larger. A strip of paper should be pasted lengthwise of the bottle, and at the lower end of this the tare should be marked. It should then be graduated to the quantities desired by weighing into it the proper quantity of water and marking at each level if more than one be desired. This graduation simply serves as a reminder to know when to try the bottle on the scale, for whether the finished fluid extract be adjusted weight for weight, or by an arbitrary weight in each case so as to get the relation of minim for grain, this must equally be done by weighing.

It is convenient to have 6 to 10 of such bottles, and then as soon as 4 are filled from one percolation another can be started, and thus relieve some of the bottles for use over again. The bottles should be numbered from 1 to 10, to keep the proper order of using them, and if more than one series is in use at the same time the second should be designated by the first letters of the alphabet instead of numbers. The maceration should never be less than 48 hours, and a longer time does not seem to be of any use unless the powder be coarse and of hard particles. When the percolation is to be started the percolator is raised to the position of Fig. 3, and the end of the exit-tube placed in the bottle marked for the reserved percolate, for 10 or 15 minutes, in order that the bubbles of air may be driven out and the tube to be filled solid with liquid. As soon as this condition is attained the percolator is lowered to the position of Fig. 1, and the receiving bottle is then to be adjusted higher or lower until a rate of dropping is established of not more than one drop per minute on this small scale; and one drop every two minutes makes a better rate for such quantities. Indeed the rule for all percolation is, the slower the rate the more perfect the exhaustion, and with a smaller quantity of menstruum.

This slow rate and the automatic supply by the inverted bottle admit the process to go on night and day, but if it be desired to go slower, that a mark may not be passed in the night, the bottle has only to be raised or the percolator lowered a little, and by a still greater change of levels the dropping may be stopped altogether. On rare occasions, when dropping at a uniform rate, it will stop altogether, or become very slow. This is in consequence of a bubble of air getting over the orifice of the glass-tube inside and acting as an obstruction. If the tube be moved from side to side, the air-bubble will be started and pass down, and the rate of dropping be resumed. If not thus dislodged, it will most certainly be by raising the percolator for a short time into the position of Fig. 3. With some powders, and some degrees of moistening and packing, the proper rate of dropping will require the position of Fig. 2, and in some stages of many percolations this position will be required; while, if for want of skill and experience the packing be too hard, the position of Fig. 3 may be needed from the first. But the best percolations are those obtained by the position of Fig. 1, where the whole mass is in the equilibrium of maceration, and the fluid all moves downward together at a very slow rate. As the more concentrated portions of percolate get through, the rate of dropping increases for any position, and occasionally, with loose packing, the position has to be altered to check it. But after the reserved portion has been received, and the quantity required to moisten the next powder, the rate of dropping may be doubled without much harm, and thus half the time be saved. The slow and uniform rate of dropping is the important point to be attained, and the various positions are simply means of accomplishing this. It is easy to obtain complete exhaustion. That is, a percolate almost colorless and tasteless, and having the same specific gravity as the menstruum; and how far short of this to stop the process cannot be indicated. But upon this small scale, the percolate from the first portion should weigh from three to four times the weight of the powder, and in the repercolations from five to seven times the weight of the powder. And then, with fair exhaustion each time, the results must continually check each other and improve until, after ten or twelve repercolations, a nearly mathematical accuracy must be attained, and ever after be maintained, all the variation being in the quality of the drug used. The writer has many series of repercolations, on various scales of quantity, which were started five years ago, and suspended from one season of the fresh drug to another, but never interrupted to begin anew, and such would go on indefinitely and with entire uniformity of result if the drugs could be obtained of a quality as uniform as is the process.

Should this method by repercolation become officinal, or come into general use, the apparatus-makers would soon supply a flat-bottomed glass percolator and cover of better form than the lamp chimneys, and of all sizes, at moderate prices. If so, no better form could be adopted than that shown in the following cut, if the bottom be flat or very nearly so, and the exit-tube be of the proper size to receive a No. 5 vial cork. Then such a cork bored to receive a piece of glass tubing 1.6 inch (= .04 m.) long, with about 3 mm. bore, would adapt it to the small rubber tubing used with the lamp chimneys. Even with the glass percolators now in common use, a short section of small rubber tubing serves as a cork to go inside the outlet, and the short piece of glass tubing through that. Then the small rubber tubing is used exactly as with the lamp chimneys.

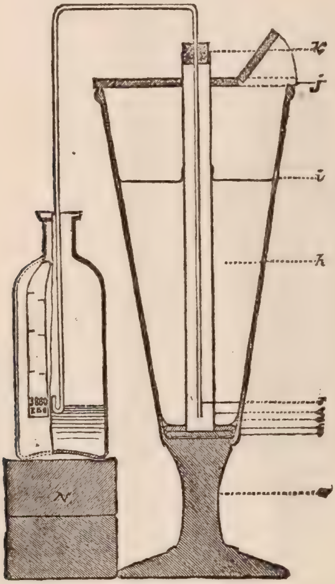
Fig. 93.



Scale, one-sixth of the actual linear size.

The chief object of presenting this illustration is to show a convenient way of applying the principles involved in the siphon percolator to the glass percolator in common use, in order to try to tempt those who have such percolators to use the method in percolation and repercolation. The cut is so plain and so easily understood that it needs but little explanation. The percolator is shown in the position of having been stopped for the night, lest the receiving-bottle should be filled beyond the proper mark. The siphon here is made in two parts, one end of the upper part being telescoped within a larger piece of glass tubing, and the junction made tight by a short section of rubber tubing, through which the smaller tube is free to slide. During maceration, or when the percolation is arrested, the upper part of the siphon is drawn up until the liquid will no longer flow over into the bottle, and the height at which this column of liquid ceases to flow over is a measure of the comparative density of the liquid within and without. As seen in the cut, the liquid will not flow over into the bottle, although the column is several inches short of the height of the liquid in the percolator. But as exhaustion progresses, and the liquid in this column becomes less dense, its counterbalancing height becomes greater, until finally, when the

FIG. 94.



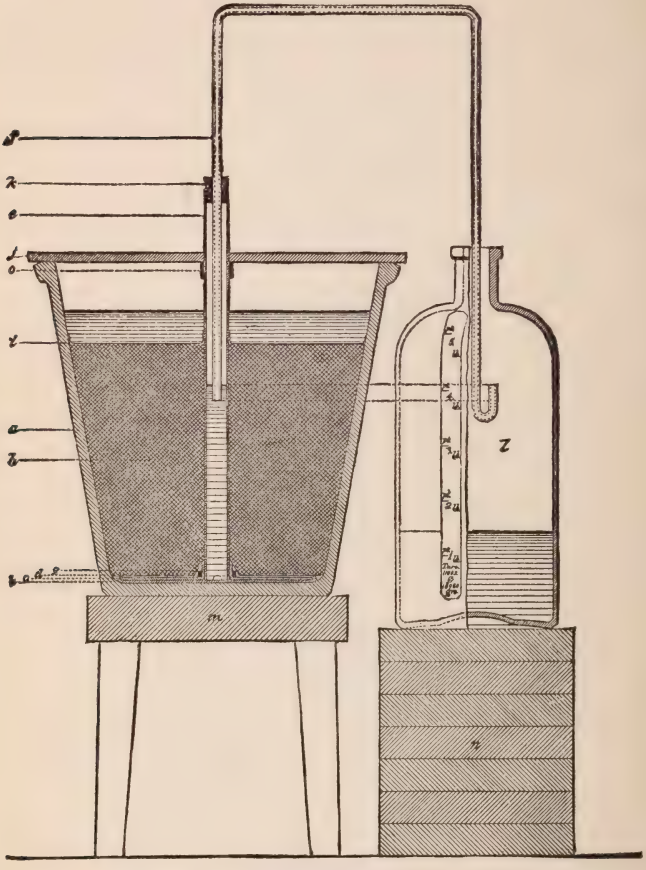
Scale, one-sixth of the actual linear size.

powder is exhausted and the liquid within and without are of the same density, the column rises to the level of the liquid within the percolator minus the friction and capillarity. When the percolation is to be started, the siphon is simply pushed down through the rubber until the liquid flows over, and then the rate is established by carefully raising or lowering the siphon. This sliding-joint, for varying the length of this column of liquid at will, being understood, the other details are plain enough, whilst the charging and the general management are the same as in the smaller and larger percolators.

However attractive the simplicity of the lamp chimney arrangement may appear it does not yield so good results as the form of percolator reproduced here, with slight improvements, from the "Proceedings of the Amer. Pharm. Asso." for 1872, p. 182, for several reasons. First, because the principles involved are not so well carried out, and secondly, because the quantity of substance operated upon is too small. Very good and uniform results need hardly be looked for when the quantity operated on for each percolation is less than an avoirdupois pound. That is, when less than that quantity is used, great care and skill are necessary to get good results. Another percolator, applying the same principles by the same details, but having about five or six times the capacity of the first, was soon after made and put into use, and cuts of these two percolators are shown upon the next and the opposite page, of their relative sizes, both upon a scale of one-sixth of the actual linear dimensions, the reference letters denoting the same parts in both. Of course the principles involved when once understood can be applied to vessels of any kind and size by means of common glass tubing, and in order to have these principles tried by less prejudiced persons than the writer, the mechanism will now be given as plainly as possible, as applicable to this best form of apparatus.

The percolator, *a*, is of the form of the more modern glass or tin percolators, somewhat funnel-shaped to allow substances to swell without becoming impacted, but having no special angle. The smaller has a glass stem and foot like an ordinary celery glass, and the larger is an ordinary stoneware pot, neither having an opening in bottom nor sides. The smaller is about 16 inches (=40 centimeters) in height, of which height about 4 inches (=10 centimeters) is stem and foot, and is of a proper capacity for 16 to 20 ounces (= 500 to 600 grams) of material and a proper stratum of menstruum. The bottom, internally, should be about 2 inches (= 5 centimeters) in diameter and should be flat, not cup-shaped, as the glassblowers are apt to leave it. A rim of glass is made upon the upper edge or lip, to strengthen it, and this lip is ground

FIG. 95.



Scale, one-sixth of the actual linear size.

off so that the cover may fit accurately, to prevent loss by evaporation. The height of the foot and stem is not a matter of indifference, since if too short it has to be set upon a stand in order that the receiving-bottle may be conveniently changed.

The larger percolator, *a*, is a stoneware pot of about 2 gallons (= 7557 cc.) capacity, 10 inches (= 24 centimeters) high and across the top, by about 6 inches (= 14.4 centimeters) across the bottom, inside, and it will conveniently hold 4.5 to 6.5 pounds (= 2 to 3 kilos), and a proper stratum of menstruum. When to be used for a variety of substances in succession such pots should be well burned and well glazed, to prevent the liquids from getting into the body of the ware.

A disk of blanket, *b*, is cut of such a size and shape as to lie flat upon the bottom, and cover it entirely. Another disk of the same material, but a little larger, *c*, is made with a crucial incision in the centre, so that it may be stretched over the end of the well-tube, *e*. The central or well-tube, *e*, is a simple piece of glass tube about 12 inches (= 30 centimeters) long, by .5 to .75 inch (= 1.5 to 2 centimeters) internal diameter, irregularly notched, or gnawed off obliquely at the lower end. One end of this well-tube, *e*, is pushed through the crucial cut in the centre of the upper disk of blanket, *b*, and the blanket is pushed to the other end of the tube, so that the corners made by the crucial cut are reflected up against the outside of the tube. These corners are then tied firmly to the tube by passing twine around them, or, are secured by a stout rubber band, *g*, made of a section of rubber tubing of proper size. A disk of filtering-paper, *d*, larger than the upper blanket, *c*, with a crucial cut in the centre, and nicked round the edge so as to lie flat against the sides of the percolator where reflected up against them, is pushed down upon the upper blanket, the well-tube passing through the crucial cut in its centre.

If now a piece of paper be twisted round the upper end of the well-tube, or a cork be temporarily stuck into it, to keep out the moistened powder, the percolator is ready to receive its charge, which is packed around the well-tube and upon the disks of paper and blanket so as to occupy the main body of the percolator, *h*, up to about the position of *i*.

When the charge, having been properly moistened, rubbed, and sifted, so as to be entirely uniform and free from wet lumps, is packed around the well-tube loosely or firmly, according to the nature of the substance and the menstruum, its surface is covered by a disk of muslin or paper, *i*, cut so as to lie flat and smoothly upon the surface. The object of this is to distribute the menstruum as it is poured on, and to prevent the stream from breaking up and deranging the surface. Should this disk show a tendency to float in the stratum of menstruum it may be weighted down by a few fragments of glass. The percolator is then ready to receive the menstruum or weak percolate, and a stratum of the liquid should be carefully kept covering the entire surface well until the whole mass of the substance to be percolated is entirely saturated. The cork is to be taken from the well-tube before the liquid is poured on, and then the liquid will pass down into the substance like a piston, pushing the interstitial air down before it to pass out through the blankets and the well-tube; and finally the liquid will rise in the well-tube until its surface is within an inch or so of the surface of the liquid outside.

The whole substance is now in a perfect condition for maceration, and the surface should be left covered with the liquid to the depth of at least .4 inch (= 1 centimeter). In the larger percolator a short section of rubber tubing, *o*, is stretched over the upper end of the well-tube, and slipped down so as to support the centre of the cover. A tightly fitting cover, *j*, made of sheet rubber .25 inch (= 6 millimeters) thick, with a hole in the centre for the well-tube, is then put on. If made of sheet rubber this cover fits so closely that it will soon save its cost by preventing loss of alcohol by evaporation. Its size in the larger percolator permits one side to be bent up when liquid is to be poured in. But in the smaller percolator it is very convenient to have one side of the cover cut two-thirds through from below, as shown in the cut, the undivided portion forming a good spring hinge permitting this part of the cover to be easily raised to pour on liquid. If a self-feeding bottle be used, as is generally advisable in order to keep the level of the liquid constant and thus obtain a flow at a uniform rate, it may be easily applied by making a hole of suitable size in the cover. When thus supplied and covered the maceration should continue for 48 hours at least. The whole arrangement now represents a well, dug in a wet soil of a substance to be percolated, and the proposition is, to pump out this well at so slow a rate that the liquid from outside the well coming in to supply that rate, through the disks of paper and blanket, which represent the gravel stratum of the soil, may descend so very slowly as to be nearly frictionless. The object is, to give the whole liquid up as nearly possible to gravitation, and to so diminish the rate of descent that the particles or portions of liquid which pass between and around the particles of solid matter may travel downward no faster than the portions of liquid which pass through the pores or interstices of the more solid substance whose soluble portions are to be washed out. Because, if the whole mass of liquid travelled downward at absolutely the same rate through a perfectly saturated mass of solid permeable substance partially soluble in the liquid, and if the molecules of liquid passed downward in absolutely straight lines, through some particles, but between others, and always at a uniform rate, it is easy to see that all the first portion of the liquid would come through saturated, and all the remainder would hold nothing in solution, because the substance would be absolutely exhausted by just the quantity of liquid which it was capable of saturating. The writer has on one or two occasions made percolations so slowly as to somewhat approximate this theoretical result. The dropping in one case was not over 4 drops in 24 hours, or about a cubic centimeter every 5 days. To pump out this well at a uniform rate which can be easily controlled, is therefore the most important element in a successful percolation, and the only one which has offered much difficulty in the past. And it can only be effectually done by means of maintaining a difference of levels in the liquid inside and outside of the well-tube. The moment a drop of liquid is taken from the well-tube, the liquid outside tends to supply its place, and will supply it in a certain definite time; and if the entire mass of liquid be under the same tension, and equally free to move through the short distance required at the slow rate required, then as liquids are practically inelastic, every drop throughout the whole mass, whether in the interstices of the solid particles or between those particles, will have moved downward through the distance and at the rate required to supply its share of the drop required to replace the one taken from the well. And if the volume of the drop be compared with the total volume of liquid set in motion, and the rate of its movement as taken out be multiplied into the mean horizontal area of the percolator, a good indication is obtained of the almost infinite slowness with which the vertical columns of molecules of the liquid descend through the mass, and the physical laws which govern percolation may be better understood.

The proposition, then, is to keep the total mass under a uniform tension throughout, and to do this by maintaining a difference in levels between the liquid inside and outside the well; and this difference of levels, which varies with each substance, and with every stage of the percolation of the same substance, is to be maintained by drawing liquid from the well at so slow a rate as to disturb the uniformity of tension throughout the whole mass as little as possible, so as to have the whole liquid in motion at a uniform rate like a slowly-descending piston. Of course, the simplest way of taking the liquid from the bottom of the percolator is the old often-used stopcock in an opening in the bottom, but this proves objectionable for several reasons. First, it is difficult, though not impossible, by means of a stopcock at the bottom, to keep the whole mass of matter at a uniform tension, or in uniform maceration. Channels of liquid in more rapid motion are more apt to form, and the packing has to be much more carefully done in order to prevent this tendency to currents in the mass. Next, in actual practice, it was found that no stopcock could be arranged to do its work automatically according to the natural requirements and varying conditions of each case. It must be arbitrarily set to run at some rate of dropping that would be decided by the judgment of the operator, rather than by the natural conditions and laws of the process. Then no stopcock could be found which would continue to run at so slow a rate of dropping with any degree of uniformity through so long a time. The smallest particle of solid matter would diminish the rate, or stop it altogether, so that it required to be continually watched or re-adjusted, and every change that was made disturbed the whole of the delicate balances and motions of the process. Again, all the metals of which ordinary stopcocks are made are attacked by the liquids in so long a process, and have the same objection that metallic percolators have. Glass stopcocks were tried, but they were found equally liable to all the objections except the last. This experience led the writer directly to the well-tube, and to the use of a siphon, *f*, as best fulfilling all the conditions required, since it can easily be set lower or higher, to adjust the levels to the desired rate of motion, and having a free flow it works automatically and with certainty. This siphon, *f*, is made of glass tubing, of about .125 inch (= 3 millimeters) bore, bent twice at right angles, the two legs being about 12.5 inches (= 31 centimeters) long. The outer leg is a little longer than the inner one, and turned up upon itself for about .750 inch (= 2 centimeters), as shown in the cuts. The legs should have only such a difference in length that the inner one should reach the bottom of the well-tube when required, and when measured upon the outer one, should reach to about midway of the turned-up end of the outer leg. This construction prevents the siphon from emptying itself at any time, for, when the liquid is drawn over by the siphon until the surface of liquid in the well-tube falls to a level with the end of the turned-up portion, as shown by the lines in the cut of the larger percolator, the columns of liquid in the siphon will be of equal length and will counterbalance each other, and therefore the flow will cease without emptying the siphon. But as soon as the level of liquid in the well is raised by fresh additions of menstruum on to the substance, the flow will recommence at a rate proportionate to the difference of levels, and may be readjusted to the required rate by slipping it up or down in the cork, *k*, in the upper end of the well-tube. This cork, *k*, should be bored to fit the siphon so tightly as to hold it in any position, and should have a groove filed longitudinally on its outer side so as to allow free entrance and exit of air to the well-tube. A receiving-bottle, *l*, upon which a strip of paper is pasted to receive any graduation-marks that may be desired, completes the apparatus. The strip of paper on the bottle should have the tare of the bottle in grams and in grains marked in ink at its lower end, and should then be varnished. Then the graduation-marks may be made with pencil, and be rubbed out and replaced as different graduations may be required for different substances, the graduations merely indicating when to try the weight of the accumulating percolate. A wooden stand, *m*, is necessary for the larger percolator to enable the receiving-bottle to be conveniently removed and replaced without disturbing the siphon, and wooden blocks, *n*, are necessary to support the receiving-bottles at various heights. As as general indication, the rate of dropping from the smaller percolator should be about six or eight drops to the minute, and for the larger one about ten to twelve to the minute. But it should always be borne in mind that the rate cannot be uniform without some self-feeding arrangement that will preserve a uniform stratum of liquid upon the surface of the substance, and that, with such an arrangement, the slower the rate the more perfect and the more economical the exhaustion will be. With a rate of two or three drops a minute, the results are practically perfect, when the conditions of fineness of powder and appropriate menstruum are properly fulfilled.

The maceration for at least 48 hours is useful for many reasons, chiefly that the adjustment of temperature and solubility may take place fully and naturally; that the particles may be thoroughly permeated by the liquid, and the liquid become saturated. And because if the maceration be omitted, the percolate, in many cases, will not be entirely bright or clear. Then, as a rule, the longer the maceration, within reasonable limits, the stronger will be the percolate that comes next after the maceration, no matter at what stage of the repercolation the maceration be applied.

When the maceration is completed and the percolation to be started, the siphon is put in place with about 3 inches (= 7.2 centimeters) of the inner leg immersed in the liquid of the well-tube. Then the best way to start the siphon is by means of a piece of glass tubing of the same size as the siphon and any convenient length, armed at one end with a short section of rubber tubing of such size as to slip over the end of the turned-up part of the siphon easily, but fitting tightly, or being tied onto, the end of the piece of glass tubing. The siphon and receiving-bottle being now in position to start, the rubber end of the glass tube is passed into the neck of the receiving-bottle and down till the rubber slips over the end of the turned-up portion of the siphon. Then, by gentle slow suction with the mouth at the upper end of the glass tube, the siphon is slowly filled, and when filled the glass tube and rubber are removed. As soon as the dropping commences the siphon must be raised or lowered until the desired rate of dropping is attained. If the siphon has to be raised in order to attain the rate, it must be done little by little, in order to avoid raising the inner end out of the liquid in the well. The rate of dropping can only be established with entire uniformity when the inverted automatic feeding-bottle is used for supplying menstruum, because when the menstruum is poured on from time to time the dropping will be a little faster as the outside level is raised by each addition.

When weak percolates of diminishing strength are successively used on top, the stratum of liquid should be kept thin, so that each stronger weak percolate may have nearly all sunk into the substance before the next weaker one is used. In receiving the percolate, the blocks, *n*, are used to support the receiving-bottle in any position, and when the percolation is to be stopped, or made to go very slowly, during the night, for example, this may be effected either by raising the siphon higher or by blocking up the receiving-bottle so that the outer end of the siphon is immersed in the percolate received to the necessary depth. Of course when the receiving-bottle is blocked up so that the mouth, or desired mark upon the bottle, is near the level of the liquid in the percolator, the bottle can never run over nor the mark so raised be surpassed. The dropping end of the siphon should always be inside of the receiving-bottle, because thus all loss by evaporation is avoided, the air inside the bottle being still and being saturated. If the same rate of slow dropping was carried on outside in the moving air of a room, and the drops fell into a funnel, for example, about one-fourth of the menstruum would be lost by evaporation, the more volatile portions in greater proportion, and the percolate would be turbid and unfit for use.

The last weak portions of percolate may almost always be pushed through by the careful use of water on top, and in proportion as the operator acquires skill in the management, little menstruum will be lost. When exhaustion is practically complete the siphon is pushed down to the bottom of the well, and the last weak percolate drawn off rapidly.

Then if another portion of the same substance is to be put into the percolator, the exhausted residue should be so removed as not to disturb the disks of paper and blanket at the bottom.

The principles of this process once well understood, modifications of apparatus will occur to many. The simplest of those that have been tried on a scale larger than the one above shown with lamp chimneys, is to dispense with well-tube and siphon, and replace them with a piece of rubber tubing of small bore. One end of this is placed between the two disks of flannel near the centre of the percolator, and then the tubing is led up through any part of the packed substance, say near, but not against, the side of the percolator, as this would leave channels for liquid, and then out over the edge of the percolator. Then a small bent portion of glass tubing is slipped into the end of the rubber so as to represent the end of the glass siphon. This end can then, by the flexibility and length of the rubber tube, be kept at any desired position. This, however, does not answer as well in practice as the well and siphon, nor does any other yet tried, including the simplification adopted with the lamp chimney, answer as well, when judged by the results obtained.

The writer made a conditional promise at the request of the committee that he would give a table showing his own practice with fluid extracts in regard to the menstruum now used for each, the weight of a pint of the menstruum and the weight of a pint of the finished fluid extract in each case, as bearing upon the proposed new relation of making them weight for weight instead of minim for grain. This table is now offered.

The forgoing part of this paper was originally published in the *American Journal of Pharmacy*, for May, 1878, but for want of time it was not in a complete condition. It was afterwards reprinted from the *Journal* by the author, in pamphlet form, with some additions and corrections, and with some of the tables and other details completed; but still the subject and the original design of the writer were left incomplete for want of a table of the details of practice by repercolation, which could be supplied from the writer's experience, with a large number of the fluid extracts in common use during the twelve years embraced by the paper.

As these details embrace the fineness of powders, the menstrua used, the tension of packing, and the weight of the finished fluid extracts; and as these details had furnished throughout a number of years a series of the most important fluid extracts, many thousands of pounds of which had been successfully used by the medical profession throughout the United States; and as the writer had no objection to publishing the results of his experience and labor for the general good of pharmacy and medicine, it was thought to be worth while to complete the paper referred to and offer it to the Association, for the benefit of whose Committee on Revision of the Pharmacopœia the work was originally undertaken. The Association may now, at its pleasure, place the whole or any part of the now completed paper on its records in the Proceedings.

In the following table the first column gives the drugs repercolated.

The second column gives the fineness of powder used; the number indicating the number of the sieve through which all the powder would pass, coarse and fine together. And the number of the sieve indicates the number of meshes to the linear inch. For example, No. 20 gives a mesh $\frac{1}{20}$th of an inch square less the diameter of the wire, leaving the opening to be, say $\frac{1}{30}$th of an inch. In three cases two numbers are given to indicate that the difference between the coarser and finer particles is much greater than common. The first number indicates the sieve through which the whole would pass. The second that through which the finer portion would pass. In the two articles of Cotton-root bark and Stillingia the "C. C." of the table means cut and crushed, or torn into short shreds.

The third column gives the menstrua used. All these give good, efficient fluid extracts, but they are not all the best that could be devised through the proper research. Many are results of frequent trials and changes, and many are used in deference to pharmacopœial authority where these are necessary to obtain pharmacopœial results. But where pharmacopœial results are not reached by the menstrua directed, and where they are better reached by different menstrua, those directed by the Pharmacopœia are not used. It is very doubtful whether all those which consist of "Stronger alcohol," or "Alcohol," would not be better if alcohol of lower strength was used. The many and great advantages of weak menstrua render a thorough investigation of this point very important before the next formulas are adopted.

The "Str. Alcohol" of the table is the U. S. P. officinal, sp. gr. .817. The "Alcohol" is the U. S. P. officinal, sp. gr. .835. The "Dil. Alcohol" is the U.S.P. officinal, sp. gr. .941. The "Glycerin" is the U. S. P. officinal, sp. gr. 1.25. The "Acetic Acid" is the U. S. P. officinal, 36 p. c., sp. gr. 1.047. And the "Water of Ammonia" is the U. S. P. officinal, 10 p. c., sp. gr. .960.

All the menstrua are made by weight, and not by measure.

The fifth column gives the proportion of menstruum or of weak percolate which has been found best to moisten the powder properly before sifting and packing. For example, the officinal portion of 16 troy ounces of Aconite Root takes, by the table, 6 troy ounces of menstruum or of weak percolate to moisten it properly before sifting to pack.

The sixth column indicates approximately the pressure to be used in packing the moistened and sifted powder. To make the terms used in the table a little more definite, the following definitions may be useful. "Loosely" means that the moistened powder is put in layer by layer and uniformly distributed with the least pressure upon each layer that will secure entire uniformity throughout, the slight pressure increasing toward the last or upper layer. "Moderately" is intended to indicate a pressure upon each layer that would be about equal to 45 pounds if both hands be pressed upon a scale. "Firmly" is to indicate a pressure of about 60 pounds; and "Hard" means 75 pounds or more.

The last heading of the table, consisting of two columns, gives the maximum and minimum weights of the pint of finished fluid extract through an experience of many years of actual practice. The difference between the maximum and minimum—the menstruum and other conditions being equal, and the exhaustions complete—indicates approximately the quality of the drug used. The average experience of the last three or four years, from greater knowledge, pains and care in selecting, and better facilities for obtaining good materials, give results which are considerably above the mean of the extreme weights as given in the table, and approximate much more nearly to the maximum weights. Hence this maximum column may be received as the fairest and clearest expression of the practice at the present time. It should not, however, be forgotten for a moment, that the weight or specific gravity of a fluid extract is not by itself any evidence either of the quality of the preparation or of the drug from which it is made. Nor even, if the menstruum be accurately known, is the difference between the specific gravity of the menstruum and that of the finished fluid extract, an accurate measure either of the quality of the drug used, or the completeness of the exhaustion, for it may be very easily seen by a close scrutiny of the tables given in the first part of this paper, that in repercolation the amount of solid matters dissolved out of any drug by a properly adjusted menstruum, does not increase arithmetically with each repercolation, although the active and desirable portions generally do increase arithmetically or nearly so. That is, the weak percolates are none of them as medicinally strong as they seem to be if judged by appearance and by specific gravity. Or, in other words, the weak percolate is a better solvent for the active principles of a new portion of the same drug, than is the new menstruum, even though the specific gravities of the two are greatly different.

FLUID EXTRACTS BY REPERCOLATION.

TABLE OF DETAILS.

DRUG REPERCOLATED.	Fineness of Powder, Sieve Number.	MENSTRUUM USED.	Weight in grains of one pint of menstruum at 25° C. = 77° F.	Parts of menstruum or of Weak Percolate to moisten sixteen parts of powder.	How Packed.	Weight in grains of a pint of finished Fluid Extract at 25° C. = 77° F.	
						Maximum.	Minimum.
Aconite Root	80	Alcohol.	6023	6	Moderately.	6843	6620
Arnica Root	20	Dil. Alcohol.	6824	16	Hard.	7460	7170
Aromatic Powder	20	Str. Alcohol, 2 parts. Water, 1 part.	6447	6	Firmly.	7000	6853
Asarum	20	Dil. Alcohol.	6824	8	Firmly.	7475	7290
Belladonna Leaf	80	Str. Alcohol, 2 parts. Water, 1 part.	6447	7	Firmly.	7425	7030
Belladonna Root	80	Str. Alcohol, 2 parts. Water, 1 part.	6447	5	Firmly.	7532	7150
Bittersweet	80	Dil. Alcohol.	6824	10	Firmly.	7650	7362
Buchu	80	Str. Alcohol.	5908	7	Hard.	6610	6300
Buckthorn Bark	20	Str. Alcohol, 4 parts. Water, 15 parts.	7003	12	Hard.	7764	7530
Butternut Bark	80	Dil. Alcohol.	6824	10	Moderately.	7510	7265
Cannabis Indica	8	Str. Alcohol.	5908	6	Hard.	6431	6264
Capsicum	20	Str. Alcohol.	5908	5	Hard.	6477	6330
Cardamom Compound	20	Str. Alcohol, 2 parts. Water, 1 part.	6447	6	Hard.	6890	6710
Cimicifuga	20	Alcohol.	6023	5	Moderately.	6998	6650
Cinchona, Yellow	40	Alcohol, 3 parts. Glycerin, 1 part.	6632	8	Firmly.	7690	7410
Cinchona, Yellow, Comp.	40	Alcohol, 3 parts. Glycerin, 1 part.	6632	8	Firmly.	7690	7425
Cinchona, Red	40	Alcohol, 3 parts. Glycerin, 1 part.	6632	8	Firmly.	7692	7415
Cinchona, Red, Comp.	40	Alcohol, 3 parts. Glycerin, 1 part.	6632	10	Firmly.	7588	7430
Colchicum Seed	30	Str. Alcohol, 2 parts. Water, 1 part.	6447	6	Hard.	7320	6840
Coca Leaf	20	Str. Alcohol, 1 part. Water, 2 parts.	6943	11	Hard.	7823	7590
Columbo	4-12	Dil. Alcohol.	6824	7	Loosely.	7313	7120
Conium Seed	20	Dil. Alcohol, 86 parts. Acetic Acid, 1 part.	6824	7	Moderately.	7690	7390
Cotton-Root Bark	c. c.	Str. Alcohol, 2 parts. Glycerin, 1 part. Water, 1 part.	6960	6	Hard.	7887	7625
Cubeb	20	Str. Alcohol.	5908	Dry.	Hard.	6604	6288
Cypripedium	20	Dil. Alcohol.	6824	8	Hard.	7690	7415
Dandelion Root	20	Dil. Alcohol.	6824	5	Firmly.	7880	7650
Digitalis	80	Alcohol.	6023	6	Firmly.	7026	6650
Ergot	30	Dil. Alcohol, 86 parts. Acetic Acid, 1 part.	6824	3	Firmly.	7462	7400
Eucalyptus	20	Str. Alcohol.	5908	10	Firmly.	6980	6980
Gelsemium	80	Dil. Alcohol.	6824	6	Firmly.	7443	7235
Gentian	20	Dil. Alcohol.	6824	7	Hard.	8273	7810
Gentian Compound	20	Dil. Alcohol.	6824	12	Moderately.	7991	7738
Ginger	20	Str. Alcohol.	5908	4	Hard.	6273	6100
Guarana	50	Dil. Alcohol.	6824	5	Firmly.	7625	7550
Hydrastis	20	Dil. Alcohol.	6824	5	Hard.	7763	7434
Hyoscyamus	80	Str. Alcohol, 2 parts. Water, 1 part.	6424	7	Firmly.	7411	6993
Ipecacuanha	80	Alcohol.	6023	7	Moderately.	7130	6970
Juniper	8	Dil. Alcohol.	6824	Dry.	Hard.	8304	8105

FLUID EXTRACTS BY REPERCOLATION.—CONTINUED.

DRUG REPERCOLATED.	Fineness of Powder, Sieve Number.	MENSTRUUM USED.	Weight in grains of one pint of menstruum at 25° C. = 77° F.	Parts of menstruum or of Weak Percolate to moisten sixteen parts of powder.	How Packed.	Weight in grains of a pint of finished Fluid Extract at 25° C. = 77° F.	
						Maximum.	Minimum.
Lactucarium	12	Dil. Alcohol.	6824	Dry.	Moderately.	7576	7543
Leptandra	20	Str. Alcohol, 2 parts. Water, 1 part.	6447	8	Hard.	7585	7290
Liquorice Root	6-50	Str. Alcohol, 2 parts. Glycerin, 1 part. Water, 7 parts.	7237	9	Hard.	8573	8240
Lupulin	60	Str. Alcohol.	5908	6	Loosely.	7430	7254
Nux Vomica	12	Str. Alcohol.	5908	11	Hard.	6290	6170
Pareira Brava	80	Str. Alcohol, 2 parts. Glycerin, 3 parts. Water, 5 parts.	7537	9	Moderately.	8178	7770
Pilocarpus	20	Str. Alcohol, 1 part. Water, 2 parts.	6943	8	Moderately.	7576	7543
Pleurisy Root	20	Dil. Alcohol.	6824	8	Firmly.	7672	7301
Podophyllum	20	Str. Alcohol.	5908	6	Hard.	6370	6300
Prickly Ash Bark, Northern.	20	Dil. Alcohol.	6824	5	Hard.	7323	7118
Prickly Ash Bark, Southern.	20	Dil. Alcohol.	6824	5	Hard.	7310	7170
Quassia	8	Dil. Alcohol, 2 parts. Water, 1 part.	6990	10	Hard.	7215	7074
Rhatany	80	Alcohol, 28 parts, Glycerin, 16 parts. Water, 21 parts.	7137	8	Moderately.	8398	8100
Rhubarb	20	Alcohol, 3 parts. Glycerin, 1 part.	6632	8	Firmly.	8315	7783
Sanguinaria	20	Dil. Alcohol, 86 parts. Acetic Acid, 1 part.	6824	8	Moderately.	7883	7600
Sarsaparilla	6-30	Str. Alcohol, 1 part. Glycerin, 1 part. Water, 3 parts.	7447	10	Moderately.	8090	7750
Sarsaparilla Comp	6-30	Str. Alcohol, 1 part. Glycerin, 1 part. Water, 3 parts.	7447	10	Moderately.	8155	7847
Scullcap	4-20	Dil. Alcohol.	6824	10	Hard.	7774	7240
Senega	20	Str. Alcohol, 800 parts. Water of Amo. 5 parts. Water, 400 parts.	6432	4	Firmly.	7697	7466
Senna	20	Dil. Alcohol.	6824	6	Hard.	7750	7593
Senna Compound	20	Dil. Alcohol.	6824	10	Firmly.	7750	7495
Serpentaria	80	Dil. Alcohol.	6824	11	Hard.	7300	7100
Spigelia	20	Dil. Alcohol.	6824	15	Firmly.	7695	7542
Spigelia and Senna	20	Dil. Alcohol.	6824	8	Firmly.	7883	7570
Squill	entire.	Dil. Alcohol.	6824	12	Loosely.	9307	8685
Stillingia	c. c.	Dil. Alcohol.	6824	7	Hard.	7420	7163
Stramonium Seed	20	Str. Alcohol.	5908	4	Hard.	6255	6090
Uva Ursi	20	Str. Alcohol, 2 parts. Glycerin, 3 parts. Water, 5 parts.	7537	8	Loosely.	8774	8419
Valerian	20	Str. Alcohol.	5908	4	Hard.	6470	6243
Veratrum Viride	20	Alcohol.	6023	6	Firmly.	6990	6635
Wild Cherry Bark	20	Str. Alcohol, 7 parts. Glycerin, 11 parts. Water, 17 parts.	7554	7	Firmly.	8386	8020

BROOKLYN, November 23d, 1878.

The complete paper can now be had in pamphlet form entirely free of expense by simple application to the author by postal card; and the author will be very much obliged to any one who will thoroughly and carefully try the process.

ON THE USE OF FRESH AND DRY PLANTS FOR TINCTURES.*

BY J. U. LLOYD.

QUERY 43.—Do certain medicinal plants lose their medicinal properties upon drying, and will it be better to tincture them while fresh?

WITHOUT doubt, some of our indigenous plants deteriorate to a certain extent when dried, and in certain instances become worthless.

In general I find that tinctures made from fresh herbs, containing essential oils, give better satisfaction than when prepared from the dry. Also that many of our American roots, if only partially dried, furnish tinctures superior to those made from either the perfectly dry or freshly dry. Indeed as the result of my own experience I may say that the majority are improved by partial drying—just enough to drive off the larger portion of water, while upon the other hand beyond a certain point, we cannot safely carry the drying process, as it seems that the constituents of the plant are then dissociated. This change results generally in the formation of extractive matters, a point well understood by manufacturers of solid extracts, who dry their materials before exhausting them.

There are exceptions. Perfectly dry veratrum viride will produce a tincture superior to any I have been able to prepare from the fresh or partly dried root.

Three years ago I procured a barrel of fresh veratrum viride from the South. It was preserved in alcohol and came to hand in fine order. I worked it carefully, using maceration. It did not give satisfaction. Tinctures made from the dry root answered the purpose when sent to the same physicians.

The next season I procured ten gallons of veratrum viride root from Western New York, as I had seen it stated that the Northern article was superior to that of Southern growth. The roots were covered with alcohol when dry. This lot also proved unreliable. (Specimen 19.)

A tincture of dry veratrum satisfied the physicians who complained of the other. Gelsemium, upon the contrary, is undoubtedly better worked fresh.

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* Read at the Fourth Session.

This should not be the case if, as is generally supposed, the article depends upon gelsemin and gelseminic acid for physiological action.

My notes upon this entire subject were destroyed by fire. They were of such a nature as to preclude reproduction in a short time, consisting, as they did, of extracts from letters and reports from physicians, gathered during some five years; and time must pass before I can hope to replace them and give a report upon individual articles, and such a report can only be of much interest.

EXTRACTUM GLYCYRRHIZA FLUIDUM.*

BY JOSEPH P. REMINGTON.

QUERY 18.—Should the alcoholic strength of the preparation be reduced; or what other changes are desirable in the formula, to increase the adaptability for masking the taste of unpleasant medicines under varied circumstances?

THE literature bearing upon the pharmacy of the ancient and valuable drug, liquorice, possesses an interest and importance which is continually expanding as the knowledge of the usefulness of the root and its products becomes more widely extended.

One of the most valuable properties which inheres to the sweet principle, glycyrrhizin, is its remarkable power of deadening the sensibility of the gustatory nerves, and it becomes at once the proper duty of the pharmacist, in framing formulas for its preparations, to keep in sight its now most important use.

Flückiger and Hanbury state that "the root of liquorice contains, in addition to sugar and albuminous matter, a peculiar sweet substance, named glycyrrhizin, which is precipitated from a strong decoction upon addition of an acid or solution of cream of tartar, or neutral or basic acetate of lead; when washed with dilute alcohol and dried, it is an amorphous yellow powder, having a *strong bitter-sweet taste* and an *acid* reaction. It forms, with hot water, a solution which gelatinizes on cooling, does not reduce alkaline tartrate of copper, is not fermentable, and does not rotate the plane of polarization."

Alkalies easily dissolve glycyrrhizin with a brown color and emission of a peculiar odor. In the root it perhaps exists combined with ammonia, inasmuch as the aqueous extract evolves that alkali when warmed with potash. The deep yellow walls of the vessels and prosenchymatous cells appear to be the chief seat of the glycyrrhizin.

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* Read at the Fourth Session.

Z. Roussin, in a paper read before the Societé de Pharmacie de Paris, June 2d, 1875,* developed some very interesting facts upon this subject, showing that glycyrrhizin is insipid compared with the root itself, and that the purer the glycyrrhizin was made the less sweet it became. He believes that glycyrrhizin plays the part of an acid, that in the root it is combined with ammonia, and the sweet principle might be correctly termed glycyrrhizate of ammonia, or ammoniacal glycyrrhizin.

Further, the author considers that the cause of the deficiency of sweetness and value of some parcels of liquorice root frequently arises from imperfect drying, either in damp places or by a slow process, which permits a partial fermentation, with the generation of acetic acid, its consequent saturation with ammonia from the ammoniacal glycyrrhizin, and the separation of the insoluble glycyrrhizin.

The results of the experiments of the writer seem to confirm, in a large measure, these views, and to obtain a proper basis for the answer to the query, the following series of experiments was undertaken.

Experiment **A.**—Sixteen troy ounces of selected liquorice root (from a portion of 10 pounds which was carefully ground and sifted, and intended to represent good commercial root), was, after being moistened, packed, and percolated with the menstruum ordered by the U. S. Pharmacopœia, converted into fluid extract exactly according to the formula, which measured 16 fluid ounces, and set aside.

Exp. **B.**—The same quantity of liquorice root, of the same kind, was treated with 16 fluid ounces of a menstruum composed of 64 parts of diluted alcohol, U. S. Pharmacopœia, and 1 part stronger water of ammonia, and the percolation finished with diluted alcohol; the process followed was the officinal one in every other respect; 16 fluid ounces obtained and set aside.

Exp. **C.**—Sixteen troy ounces of the root, converted into 16 fluid ounces of fluid extract, using a menstruum composed of 64 parts of alcohol, 24 of glycerin, 40 of water, 2 of stronger solution of ammonia.

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* See American Journal of Pharmacy, Sept. 1875.

Exp. **D.**—The same quantity, producing the same amount of fluid extract, using a menstruum composed of 6 parts of alcohol, 6 of water, 3 of glycerin, 1 of stronger solution of ammonia.

Exp. **E.**—The menstruum used here was made up of 4 parts of alcohol, 8 parts of water, 3 parts of glycerin, 1 part of stronger solution of ammonia.

Exp. **F.**—Sixteen fluid ounces of fluid extract was made, under the same circumstances as the preceding, with a menstruum composed of 8 parts of alcohol, 16 parts of water, 5 parts of glycerin, 3 parts stronger solution of ammonia.

Diluted alcohol was used in every case to force through the last portion of percolates. The drift of the experiments was, of course, to ascertain the best menstruum and to discover the bearing that an addition of solution of ammonia to the menstruum would have upon the finished preparation.

A physical examination of the fluid extracts revealed the following points:

A	B	C	D	E	F
With officinal menstruum, sweet, sharp taste, bulky precipitate. Upon standing leaves a distinct sense of acridity upon the fauces as an after-taste.	With menstruum without glycerin, containing small quantity of solution ammonia. 1-64 of diluted alcohol. Differs but little in taste from A.	With menstruum officinal, but with addition of small quantity of solution ammonia, 1-65. Slightly sweeter, but still leaves bitter after-taste.	With increase in the quantity of solution ammonia and a menstruum more aqueous. Taste sweet, with but little acridity.	With a menstruum more aqueous than D, and the same proportion of solution of ammonia, as D. A very sweet taste, without bitterness.	With a menstruum similar to E, but slightly diminishing proportion of glycerin, increasing solution ammonia slightly. A very sweet taste, without bitterness, but slight odor of solution of ammonia.

The writer was surprised to find that the addition of the solution of ammonia to the menstruum very perceptibly diminished the acridity, which has been such a drawback to the administration of the officinal fluid extract, and the assay which was entered upon next, proved that it increased the quantity of glycyrrhizin nearly 50 per cent. in sample E. Now, whether the increased quantity of glycyrrhizin in this experimental preparation masked the acridity, which was so marked in sample A, or whether the ammonia destroyed or entered into combination with the acrid substance, was not ascertained by the writer, and it did not legitimately form part of the answer to this query, but it certainly would be interesting to have this point investigated.

The assay of the fluid extracts was conducted in the following manner:

Six cubic centimeters of each preparation was diluted with an equal quantity of distilled water, and a slight excess of diluted sulphuric acid added ; the precipitate formed was washed, dried, and weighed, giving the following results :

Quantity of Glycyrrhizin (unpurified) obtained in 6 cc. of Fluid Extract.

	A	B	C	D	E	F
Grams, . .	0.656	0.638	0.646	0.648	0.967	0.892

In view of these facts the writer would propose the following formula for an improved fluid extract of liquorice root, arranged on the plan of the present fluid extract of the U. S. Pharm.

Extractum Glycyrrhiza Fluidum.

(Fluid Extract of Liquorice Root.)

Take of Liquorice root, in moderately fine powder, 16 troy ounces,
Glycerin, 3 fluid ounces,
Alcohol,
Water,
Stronger water of ammonia, each a sufficient quantity.

Mix 4 fluid ounces of alcohol, 3 fluid ounces of glycerin, half a pint of water, and 1 fluid ounce of stronger water of ammonia. Moisten the powder with four fluid ounces of the menstruum and pack it moderately in a cylindrical percolator. Cover the surface with a disk of paper and the remaining portion of the menstruum is to be poured upon it. When the liquid begins to drop from the percolator close the orifice with a cork, and having closely covered the percolator to prevent evaporation, set it aside in a moderately warm place for four days.

The cork is then to be removed and diluted alcohol poured upon the top and percolation continued until 24 fluid ounces are obtained altogether. Of these, the first 12 fluid ounces are to be reserved and the last 12 carefully evaporated to 4 fluid ounces and mixed with the reserved portion and filtered through paper after standing 4 days.

Formulas for syrup and elixir of liquorice are appended.

Syrupus Glycyrrhizæ.

(Syrup of Liquorice Root.)

Take of Fluid extract of liquorice root, . .	2 fluid ounces.
Simple syrup, ...	14 fluid ounces.

Mix.

Elixir Glycyrrhizæ Aromaticus.

(Aromatic Elixir of Liquorice Root.)

Fluid extract of liquorice root, . . .	2 fluid ounces.
Alcohol, ...	4 fluid ounces.
Syrup, ...	6 fluid ounces.
Oil of cloves, ...	10 minims.
Oil of cinnamon, ...	5 minims.
Oil of nutmeg, ...	12 minims.

Water sufficient to make 16 fluid ounces.

PHILADELPHIA, 10th mo. 12th, 1878.

ON THE REMOVAL OF FIXED OIL FROM COLCHICUM SEED.*

BY EMIL L. BŒRNER, IOWA CITY, IOWA.

QUERY 17.—What advantage, if any, would result from the removal of fixed oil from colchicum seed, preparatory to the preparation of the fluid extract?

WITH the view of determining upon a suitable solvent for the fixed oil contained in colchicum seed, one which, while removing all of this for the preparation of the fluid extract objectionable constituent, would yet dissolve out none of the active principles of the drug, the following course was pursued, viz.: Separate portions of the drug, in powder No. 60, were treated by percolation, the one with gasolin, a second with petroleum benzin, and a third with stronger ether, U. S. P.; the several percolates resulting were carefully evaporated, until entirely free from the odor of their respective solvents.

The fixed oil thus obtained was of a density not unlike that of castor oil at a summer temperature, of a fatty odor, a pale olive color, and very slightly bitterish taste in the case of the gasolin and petroleum benzin residues, while that exhausted with ether was of a somewhat darker color, and more decidedly bitter.

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* Read at the Third Session.

To ascertain whether the oil, as removed from the powdered seed by the process described, contained any colchicia, portions of each of the three residues were severally agitated with distilled water acidulated with hydrochloric acid, the liquids filtered, and the filtrates treated for colchicia, as follows:

That from the ethereal preparation gave, with concentrated nitric acid, concentrated sulphuric acid, hydrochloric acid, and carbonate of potassium, a lemon-yellow coloration; a slight white flocculent precipitate with tannic acid; a denser, nearly white, flocculent precipitate with iodo-hydrargyrate of potassium; a heavy, kermes-colored, flocculent precipitate with iodine, and a turbidity with chlorine water—the solution becoming yellow upon the subsequent addition of water of ammonia—while the filtrates from the gasolin and petroleum benzin residues, when treated in exactly the same manner, gave no precipitates with any of the reagents mentioned; only a slight yellow coloration being produced by concentrated sulphuric acid.

Upon subjecting a portion of fixed oil separated from a fluid extract prepared by the process of the U. S. P. of 1870, to the same treatment as was pursued in the foregoing experiments, a slight yellow coloration was produced with each of muriatic, nitric, and sulphuric acids.

Ether, because of its solvent action upon colchicia, as well as on account of its greater cost, as compared with the other solvents used, was considered objectionable, and was accordingly abandoned for any further experiments. Gasolin and petroleum benzin having, apparently, about equal solvent powers, the former of these was preferred, as being more readily expelled from the drug after percolation with it, and before subjecting to the usual treatment for the preparation of the fluid extract. Upon treating a larger quantity of the powdered seed with gasolin, in the manner above described, an oil answering to the description of that first mentioned, was obtained to the amount of 9.05 per cent., and having a specific gravity of .922 at 60° F.

A portion of this oil, tested for the presence of colchicia, in the same manner as that obtained by a previous experiment, gave exactly the same results.

A suitable solvent having thus been found for the fixed oil contained in colchicum seed, its removal from the drug, before treatment in the usual manner for the fluid extract, would seem practicable, as the product obtained, unlike that of the officinal process which separates the oil upon standing, and necessitates its removal, is a perfectly clear preparation.

The advantages resulting from such a removal of the oil would seem to be quite evident, inasmuch as the fluid extract would not then be loaded with it, and would present a much more elegant appearance than does the officinal preparation. This extract being miscible with water, might perhaps even be used hypodermically, by evaporating off the alcohol, and diluting with water. The more evident may seem these advantages, when it is remembered that nothing is sacrificed, medicinally, and only a slight expense incurred for gasolin, the quantity necessary for exhaustion being scarcely twice the weight of the powder to be treated with it.

Aware of the difficulty of powdering colchicum seed, the writer sought to remove the oil by maceration, before grinding, but was unsuccessful, as only a part can be extracted in this way.

Though having no direct bearing upon the query here attempted to answer, the writer would state, that, in availing himself of the suggestions offered in Mr. J. U. Lloyd's papers, published on pages 408 and 409 of last year's Proceedings, by omitting the use of glycerin, and finishing the preparation with a mixture of three parts alcohol and one part water, a more satisfactory preparation was obtained, than when the pharmacopœia formula was strictly followed.

ON LIQUID PREPARATIONS OF LACTUCARIUM.*

BY JOSEPH L. LEMBERGER.

QUERY 29.—Give a formula for a concentrated liquid preparation of Lactucarium, from which can be made the syrup, tincture, or other preparations.

IN accepting this query the writer is fully aware of the difficulty usually met with in making the lactucarium preparations occasioned by the caoutchouc principle always present in this as well as most, if not all the products from the lactescent plants;

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* Read at the Fourth Session.

so in order to overcome this difficulty, petroleum benzin was found the most practical, being efficient and cheaper than most of the solvents for caoutchouc. It was found that by beating the lactucarium in an iron mortar until it is well crushed, it separates into layers, or plates or very coarse granulation (according to its degree of dryness), as the nearest possible approach to comminution, being impossible to powder it without the addition of sand or other foreign substance. Thus treated and macerated with benzin the caoutchouc principle is readily dissolved and the lactucarium is fitted for treatment with other menstruum. After numerous experiments the following is offered as a practical working formula for the

Fluid Extract of Lactucarium.

Take of Lactucarium, ...	. 16 troy ounces.
Petroleum benzin deodorized,	. 32 fluid ounces.
Diluted alcohol a sufficient quantity.	

Beat the lactucarium thoroughly in an iron mortar, then introduce it into a wide-mouth bottle of about 3 pints capacity, adding the benzin, corking tight, and allowing it to macerate, with frequent agitation, for 24 hours, then let it rest about 24 hours or until the lactucarium subsides, and the benzin solution becomes clear or nearly so, then having decanted the benzin solution, transfer the lactucarium to a stone or glass slab or other similar vessel, spreading it as thin as possible, allowing it to remain in this situation until completely dry (at least 24 hours), then rub it up in an iron mortar with an equal bulk of clean sand, next introduce it into a cylindrical percolator, first prepared with a disc of flannel and a thin layer of sand, pack lightly and add sufficient diluted alcohol to cover several inches, and after closing the outlet with a cork or otherwise allow it to macerate 24 hours, then percolate to exhaustion, reserving the first four fluid ounces. By means of a still reclaim the alcohol and evaporate the residue in a water-bath to ten (10) fluid ounces, mixing this with the reserved percolate, and filter, adding sufficient diluted alcohol to wash the filter and remaining residue until the product weighs 16 troy ounces.

With this fluid extract you can readily make

Tincture of Lactucarium, as follows:

Take of Fluid extract lactucarium, . .	1 troy ounce (℥j).
Diluted alcohol, ...	. q. s. for f℥viij.

A fluid drachm representing 7½ grains.

For

Syrup of Lactucarium,

Take Fluid extract of lactucarium, . . 1 troy ounce (℥j).
Simple syrup, ... q. s. for f℥xvi.
A fluid drachm representing 3¾ grains.

Samples of these several preparations are herewith furnished for inspection, and I trust will meet with the approval, after fair criticism, of the Association.

PHARMACEUTICAL PREPARATIONS OF COCA.*

BY GEO. W. KENNEDY, PH.G.

QUERY 1.—In view of the remedial properties accorded to coca leaf—Erythroxylon Coca—what pharmaceutical preparation can be made having its properties in the most desirable form?

In responding to this query, accepted by the writer at our last meeting, I would say before proceeding to the formula, it is absolutely necessary that the chemical properties and solubilities of the active principle or principles of the drug be well understood. Although coca leaf is, comparatively speaking, a new remedial agent in many localities, yet in other places it is extensively known and largely used both in families and prescribed by physicians. In taking a retrospective view of the literature of the drug, I was agreeably surprised to find that so much had been written and so many experiments made with the object of isolating the active constituents of the leaves, as well as to determine their therapeutic action.

In the last issue of the Proceedings, for the year 1877, p. 188, a very correct drawing of the plant will be found, made from a plant growing in the Royal Botanic Gardens, Regent's Park, London, to which I call your attention. The leaves of several species of Erythroxylon have been known from time immemorial, and were used especially among the Indians for chewing, mixed with lime and wood-ashes. Numerous, and somewhat fabulous, accounts are given of their physiological action: a moderate use is said to produce excitement of the functions, to relieve or prevent muscular fatigue, and to some extent to take the place of food, while an immoderate chewing of the leaf, like that of opium, frequently becomes a habitual vice, producing all the deleterious symptoms and consequences of narcotics, such as a state of half intoxication, stupor, with visonary dreams, premature decay, complete apathy and idiocy. These peculiar symptoms rendered the presence of a narcotic principle probable, and induced experimentalists to undertake the investigation of the drug.

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* Read at the Third Session.

Neumann made approximate analyses of the leaf and discovered and described the alkaloid named (*cocaina*). Stanilas Martin made a hasty examination, from which it appears that he discovered a bitter principle, and a substance analogous to Theina. Maisch subsequently was led to think that the plant contained also a volatile alkaloid. This supposition was afterwards confirmed by Lossen and Woehler, who separated the new alkaloid and named it *Hygrina*. They also discovered that when cocaina is heated with muriatic acid it is decomposed, benzoic acid and a new base, *Ecgonia*, being formed. Dr. S. R. Percy, of New York, also claims to have been the first to separate the active principle, to which he proposed the name *Erythroxylin*, inasmuch as the name cocaina might be confounded with other substances of a similar name.

So far then we have the following interesting and important active constituents of the drug: cocaina or (*Erythroxylin*), hygrina, besides the essential oil, to which I have not yet alluded and to which the odor of the plant is due, and of these the first-named alkaloid is undoubtedly the principle to which attention should be given in making galenical preparations. I find from the condensed reports of investigators, that it is soluble in 704 parts of water, more soluble in cold alcohol, and quite soluble in hot alcohol and ether. From all the information I have been able to obtain appertaining to this subject, I would recommend a fluid extract and an elixir, and would propose the following formulas, which I have found to furnish very satisfactory preparations:

Extractum Cocæ Fluidum.

Coca leaves, in moderately fine powder,	16 troy ozs.
Alcohol, (95) per cent., . . .	12 fluid "
Water, ...	4 " "

Moisten the powdered leaves with the above menstruum, pack it carefully into a conical percolator, cover the surface of the powder with a disk of paper and add the remainder of the menstruum; when the liquid begins to drop from the percolator, close the lower orifice with a cork, cover the percolator closely so as to prevent evaporation, and allow it to remain in this condition 48 hours. The cork is then to be removed and percolation allowed to proceed, dropping not faster than at the rate of 40 drops per minute, as quick percolation will not furnish good results and should be discountenanced, more especially in the manufacture of concentrated preparations. When the drug to be operated upon is small, and the menstruum large, as in most of the tinctures, percolation can be allowed to proceed at the rate of 60 drops per minute with excellent results. The first twelve ounces of the percolate should be reserved, and percolation continued with the same menstruum until the drug is thoroughly exhausted; evaporate the last portion at a temperature not higher than 130° F., until reduced to four fluid ounces, and mix this with the reserved portion. The fluid extract prepared in accordance with this formula will be found of a dark greenish-brown color, and to contain in the highest degree the odor and taste characteristic of the drug.

Elixir Cocæ.

Coca leaves in moderately fine powder,	℥iv.
Alcohol and water, of each a sufficient quantity,	
Oil of orange,	gtt. vi.
Oil of cinnamon,	gtt. ij.
Syrup,	℥iv.

Mix 3 measures of alcohol with one of water, moisten the powder with two fluid ounces of the mixture, pack it firmly in a conical percolator, and gradually pour on a sufficient quantity of the menstruum until eleven and a half fluid ounces of percolate are obtained. Dissolve the oils in a half ounce of alcohol, add to the percolate and finally the syrup. This will furnish a very elegant elixir, and each fluid drachm will represent the active constituents of fifteen grains of the drug, when carefully prepared.

ON RESIN OF PODOPHYLLUM.*

BY J. U. LLOYD.

QUERY 27.—Resin of podophyllum is found upon the market in color ranging from light brown to deep yellow. Can these various shades be obtained from may-apple root without the use of foreign substances?

AT first resin of podophyllum was prepared by distilling all the alcohol from an alcoholic tincture of the root, and pouring the residue into cold water. It settled into a lump of a dark-brown color; when pounded it was a little lighter.

In the present officinal process, there is enough alcohol to cause the resin to separate in a finely divided form if the water be cold. Such an article has either a yellowish or slightly brown cast. The first portions of the percolate furnish the darkest shade. If it be dissolved in its weight of cold alcohol, filtered and precipitated in sixteen parts ice-cold water, it will be much lighter in color, as impurities are thus separated which were mechanically carried down by the first precipitate. An article thus produced is a shade darker than powdered ipecac, usually of a faint yellowish shade. As a rule, the nearer resin of podophyllum approaches white, the better.

If instead of water, or water acidulated with muriatic acid, we use an aqueous solution of alum for the precipitant, the color before mentioned quickly changes, acquiring in a few hours a rich greenish yellow. The supernatant liquid also turns yellow; this shade cannot be obtained with water, or water acidulated according to the Pharmacopœia. It results from a change in the resin, instead of the addition of another substance from the tincture.

Alum-water will scarcely produce an additional precipitate from the liquid after making officinal resin of podophyllum, but will change the powdered resin to greenish yellow, which shade, so frequently found in the market, and so often demanded of manufacturers, I have never been able to obtain without the use of foreign substances. Almost any of the colors excepting that just named, from deep yellowish brown to nearly white, can be produced with pure water for the precipitant, as the variations result generally from impurities carried down by the precipitate, or from resins of different densities. (See specimens 20, 21, 22, and 23.)

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* Read at the Fourth Session.

ON CERATUM RESINÆ COMPOSITUM.*

BY S. A. D. SHEPPARD.

QUERY 9.—Compound resin cerate alters in consistence upon keeping. How can this be prevented?"

IN attempting to answer this query, the writer labors under the disadvantage of having had no acquaintance with the preparation previous to the time when he accepted the query.

The first question presenting itself is, "What is the alteration in consistence spoken of?"

In Wood & Bache's Dispensatory it is stated that "Compound resin cerate should be kept well protected from the air, in consequence of its liability, when exposed, to acquire a tough consistence."

By observations extending over a period of five months, the writer failed to notice any other material change in the article as made by the officinal formula; he therefore opened correspondence with parties in every section of the country, hoping to gain information on the subject.

No one of his correspondents had ever dispensed the preparation, or knew of its use in their locality, and of course could say nothing of any objections that might exist to the formula as found in our Pharmacopœia, except the Chairman of the Committee on Queries, who referred to the note in the Dispensatory.

In short, his inquiries led the writer to the conclusion that instead of trying to improve the formula for the preparation, the best reply to be given to the query is, drop the preparation, as useless, from the officinal list of cerates.

Presuming, however, that there are localities in the United States where compound resin cerate is deemed an important article, the writer made a large number of experiments in April, 1878, to determine the cause of the toughness in the cerate when exposed to the air, and how it could be remedied, without impairing the therapeutic value of the preparation.

It is not necessary to go into the details of all these experiments, but simply to give results. The toughness seemed to be due to the oxidation of one or more of the ingredients.

Various oils were substituted for the linseed oil; the proportions of the various ingredients were varied, and in some cases the turpentine was left out altogether; in other experiments oil of turpentine was substituted for turpentine. Numerous admixtures of oils were substituted for the linseed oil, the other ingredients being used in varying proportions.

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* Read at the Third Session.

The conclusion finally arrived at is, that the alteration desired in the formula can be made by substituting paraffin oil (sp. gr. .895) for linseed oil in the same proportions, leaving all the other ingredients as in the officinal formula.

Oil of almonds (sweet) substituted for the linseed oil would also give a better preparation than the officinal, but not so good as that made with paraffin oil.

BOSTON, November, 1878.

ON SACHET POWDERS.*

BY WILLIAM SAUNDERS, LONDON, ONTARIO, CANADA.

SACHET powders have long been in use and the demand for them in the store of the pharmacist is in many instances an increasing one; especially is this so in large cities, where such luxuries are oftener indulged in; and where the articles sold please the customers and prove durable perfumes, the trade in them is in every way profitable to the seller. The formulas for the powders here offered will, it is thought, be found in every respect satisfactory, and afford sufficient variety to meet the requirements of most establishments. In compounding them the use of a small size "Enterprise" mill, No. 3, has been found very useful and labor-saving, and although it does not dispense with mortar-service entirely, it greatly lessens that part of the work. Such articles as musk, vanilla beans, and tonqua beans, require to be well beaten in a mortar, with a small quantity of the previously ground orris root, lavender flowers, or rose leaves. The finer these are reduced the better will be the result. The essential oils should also be dropped on the dry material in the mortar, and beaten and rubbed well together, after which add gradually the more bulky articles previously ground in the mill, until all are well incorporated. Then, with the view of mixing them still more thoroughly, pass the whole three or four times through the mill. It will, of course, be understood that to obtain a satisfactory product, the component parts must all be of the first quality.

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* Read at the Fifth Session.

Heliotrope.

Rose leaves,	2 ounces.
Orris root,	1 ounce.
Lavender flowers,	1 ounce.
Tonqua beans,	2 drachms.
Benzoin,	1 drachm.
Musk,	5 grains.
Oil of bitter almonds,	3 drops.
" santal,	30 "
" neroli,	10 "

Clove Pink.

Orris root,	2 ounces.
Lavender flowers,	1 ounce.
Patchouly leaves,	½ ounce.
Cloves,	2 drachms.
Deer tongue,	2 drachms.
Pimento,	1 drachm.
Musk,	2 grains.
Otto of rose,	10 drops.
Oil of neroli,	12 "
" santal,	20 "
" lavender (English),	10 "

Frangipanni.

Orris root,	2 ounces.
Rose leaves,	2 ounces.
Vanilla bean,	1 drachm.
Benzoin,	1 drachm.
Oil of lavender (English),	15 drops.
" bergamot,	16 "
" cassia,	6 "
" pimento,	10 "
" santal,	30 "
" neroli,	16 "
Otto of rose,	8 "

Jockey Club.

Lavender flowers,	½ ounce.
Rose leaves,	1½ ounces.
Orris root,	2 ounces.
Vanilla bean,	½ drachm.
Musk,	4 grains.
Extract of jasmin,	2 drachms.
Oil of santal,	20 drops.
“ neroli,	5 “
Otto of rose,	10 “

Mille-Fleurs.

Lavender flowers,	6 drachms.
Cloves,	2 “
Cassia buds,	2 “
Coriander,	½ ounce.
Benzoin,	½ drachm.
Nutmeg,	½ drachm.
Orris root,	2 ounces.
Vanilla,	1 drachm.
Musk,	5 grains.
Otto of rose,	5 drops.
Oil of neroli,	4 “
“ patchouly,	2 “
“ lavender (English),	4 “
“ verbena,	2 “
“ santal,	10 “

Wild Flowers.

Wild ginger root (Asarum Canadense),	1 ounce.
Deer tongue,	½ ounce.
Lavender flowers,	½ ounce.
Sweet flag root,	1 drachm.
Coriander seed,	6 drachms.
Patchouly leaves,	1 ounce.
Nutmeg,	1 drachm.
Oil of bergamot,	40 drops.
“ neroli,	10 “
“ santal,	20 “
“ verbena,	5 “
“ patchouly,	5 “
Extract of jasmine,	2 drachms.

II. MATERIA MEDICA.

ON SPICE BUSH BERRIES.*

BY ADOLPH W. MILLER, M.D. PH.D.

Query 15.—It is written of the berries of the Benzoin odoriferum (spice bush berry) that they yield nearly fifty per cent. of fixed oil, besides about five per cent. of agreeable volatile oil. Is this really so? The plant being very common in some parts of the United States, for what can its products be utilized?

In order to have amply sufficient material to furnish reliable results, fifty pounds of the spice berries, in a very fair condition, procured from the Messrs. Wallace Brothers, of Statesville, N. C., were submitted to examination. This entire quantity was reduced to a coarse powder in a mill, and was then subjected to a hydraulic pressure of 2000 pounds on the square inch of surface. Only very little oil having been obtained in this manner, the ground berries were removed from the press, moistened with water, and at the same time gently warmed by means of a steam-bath. After being reintroduced into the cylinder of the hydraulic press under these conditions, the berries yielded a comparatively large proportion of viscid oil. This was separated from the water accompanying it and then filtered. It was found to weigh 16 pounds 8½ ounces, being about 33 per centum of the crude drug. It has a consistence similar to that of castor oil, a greenish-brown color and a pungent aromatic taste. Its specific gravity was found to be .929. Mixed with double its volume of 94 per cent. alcohol, only 12 per cent. of it was dissolved, but it was miscible with ether in all proportions.

The expressed residue was next introduced along with sufficient water into a still heated by a steam-jacket, but although the operation was continued for a number of hours, only 123 grains of vol. atile oil were obtained from the entire mass, showing that the great bulk of this constituent had been expressed along with the fixed oil.

The dregs remaining in the still were then carefully dried, and two pounds of them were percolated with gasolin until exhausted. After this menstruum had been entirely removed by spontaneous evaporation, a residuum of thick fixed oil and resin was left, weighing $7\frac{7}{8}$ ounces. This amount corresponds very nearly to 25 per cent. of the weight of the expressed berries, or to about 17 per cent. of the original weight of the drug, making, together with the 33 per cent. previously obtained by expression, just 50 per cent. of oily and resinous constituents. From this amount, however, the percentage of volatile oil subsequently obtained by distillation from the expressed oil is to be subtracted. The specific gravity of this residuum was identical with that of the expressed oil, namely, .929. The two oils were also closely analogous to each other in color and in their consistence, but the taste of the expressed oil is far more aromatic than that of the residuary product. When the latter was shaken up with three times its volume of alcohol, about two-thirds of it was readily dissolved. It was freely soluble in ether. When subjected to distillation with water, the water came over almost tasteless.

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* Read at the Third Session.

One hundred ounces of the expressed oil (corresponding to about 300 ounces of the crude drug), were then submitted to distillation, being heated by steam. A yield of $2\frac{7}{8}$ ounces of volatile oil was thus procured, being somewhat less than one per cent. of the original weight of the berries. The residue remaining in the still was increased in density to .931. The essential oil has a specific gravity of .850; it is thin, bright green in color, and has a warm, aromatic taste, somewhat resembling that of allspice and prickly ash. When diluted and taken internally it seems to act as a carminative. It is deemed quite probable that this oil may prove to be an agreeable adjuvant in the preparation of the numerous refrigerant summer beverages, which are at present so popular, approximating as it does the flavors of those that are now employed, such as calamus, Canada snake-root, sassafras, ginger, allspice, prickly ash, etc.

The residue of the spice berries remaining after the expression and subsequent exhaustion by gasolin was almost tasteless.

PHILADELPHIA, August 8th, 1878.

ERYTHROXYLON COCA.*

BY JAMES G. STEELE.

THE attention of the medical world has only lately been directed to the nature and medicinal value of the *coca leaf*. In the following sketch I have endeavored to present in a succinct manner, from writers and travellers of eminence, some of the more important facts concerning the botanic features, habitat, mode of cultivation and collection, as well as effects produced by the mastication of the leaf, and the exhibition of the drug, and lastly the chemical constituents of the coca.

The *Erythroxylon coca* is a bush which attains a height of six or eight feet, and resembles in its small white flowers and bright green leaves the English "thorn." It is of the family of the Erythroxylaceæ (from the Greek, Erythroxylon being composed of the root-words Erythros, red, and xulon,wood). This family is an order of plants allied to the *Sapindales*, Diaz. Complete, partially symmetrical flowers, an imbricated calyx, petals white, with an appendage, sessile pendulous ovules, capitate stigmas, and a straight embryo. They are shrubs or trees. The order contains but one genus, Erythroxylon, which includes seventy-five species, natives of the warmer regions of the globe, and especially abundant in Brazil, closely allied to the order *Malpighiaceæ.* Some plants are tonic, others purgative, and others stimulant and sedative.

The wood of the *Erythroxylon hypericifolium* and the bark of the *E. suberosum* are red, and are used in the preparation of dyes of that color. Red is, in fact, the common color of the wood throughout the genus, hence its name. The most important species is the *Erythroxylon coca,* the leaves of which have been used for an indefinite period by the Peruvians and other people of South America (who style it "Il santo remedio—la folio de Coca," the blessed remedy—the coca leaf) to form a masticatory in a manner to be described further on. Among the authors who have written about the coca, may be mentioned the Jesuit Father Julian, Garcilasso de la Vega, the famous historian of the reign of the Incas; Von Tschudi, author of a work entitled "Travels in Peru, from 1838 to 1842;" Dr. Weddell, Clusius,

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* Read at the Third Session.

Prescott, in his memorable history of "The Conquest;" Dr. M. A. Fuentes, and Dr. J. H. Scrivener, both residents of Lima, and the English writer Johnston.

From works of these authors I have compiled an account, which though far from complete, will perhaps serve to show the value of this unique remedial agent, and direct attention to the therapeutic use as well as the botanic features, habitat, history, and uses of the plant, as also a slight résumé of the various attempts made to isolate the proximate constituents of the leaf.

The coca plant is a native of the tropical valleys occurring in the eastern slope of the Andes, in Bolivia and Peru, and it still grows wild in many parts of these countries. That which is used by the people, however, is chiefly the product of cultivation.

In the inhabited parts of the above valleys, it forms an important agricultural crop. It is raised in seed-beds, from which it is planted out into regularly arranged coca plantations. The steep sides of the valleys, as high up as eight thousand feet above the level of the sea, where the mean temperature is from 64° to 68° F., are often covered with these coca plantations.

In the cultivation of the coca, the soil is well prepared previous to the sowing of the seed, and then divided into different compartments. After the sprout has come up, which takes place in a few weeks, and when they have grown to two or three feet in height, they are transplanted within two or three feet of each other to other grounds, which are called "cocales."

These plantations are formed in the most shady places, for the purpose of protecting them from the heat of the sun, which is very powerful in the deep valleys of these regions. Indian corn is also sown between the rows, the broad shady leaf of which serves as an additional protection. During the growth of the plant irrigation is freely employed.

The coca grows luxuriantly in all the valleys, and arrives at perfection in about three years, which time is known by the height of its branches and the brittleness of its leaves, which break or fall on being carelessly handled.

The leaves, which are the valuable part of the plant, resemble in shape and size those of *tea*, being oval-oblong, pointed, two inches or more in length by about an inch in breadth, and furnished with short, delicate footstalks. They are not, however, like the tea leaves, dentate, and are distinguished by having a slightly curved broad line on each side of the midrib, running from the base to the apex. The flowers are white, and produce a red berry. When well dried and carefully preserved, they have an agreeable odor, strongly resembling that of tea, and a peculiar characteristic taste, which in decoction becomes bitter and astringent.

When the leaves have attained their full development, they have acquired a certain degree of consistency and show a brilliant deep green color, resembling the emerald, on the upper surface, and a clear pale yellow on the under side of the leaf.

During the gathering great care must be taken not to injure the young leaf-buds, or they will dry up, and the second crop of leaves be diminished. They should be gathered leaf by leaf, holding the bough with the fingers of the left hand, and collecting with those of the right. The leaves as soon as taken from the trees are spread out upon paved surfaces to dry slowly, and then stored in barns or huts. Care has to be exercised in drying, so that they are not stored away too soon, otherwise the leaves would lose their color and develop an unpleasant smell and taste. The process of drying gradually converts the color from the brilliant emerald-green before noted, to a considerably darker hue. The average produce is eight hundred pounds of the leaves to the acre. The leaves, when fully dried, are wrapped up in palm leaves and covered with flannel. Packages are made of them of fifty pounds each, which are called *cestos*, others of one hundred pounds are called *tombas*. They are then conveyed on the backs of *llamas* to the custom-house in La Paz, and sold to the miners for the Indians of their establishments.

The duties on the coca form an important revenue to the nation, amounting to about $400,000 a year. It is not known when the coca was first discovered, but it must have been at an early period, probably under the Incas. Its production was very great during the Spanish sway, for it then became an article of importance to the Indians. Previous to that period, according to Prescott, it was reserved for the Incas and nobles of the country. In the splendid and sumptuous city of Cuzco, the capital of the Incas, the coca leaf was used as an article of luxury. "The Incas and nobles masticated it in their palaces and temples, which were richly adorned with gold and silver."

The Indians of Peru refer to mystic traditions for the origin of this plant. They hold that Manco Capac, the Divine, descended in the primitive epoch from the rocks of Lake Titicaca and bestowed the light of the sun (his father) upon the poor inhabitants of the country; that he gave them a knowledge of the Gods, brought them the useful arts and agriculture, and presented them with the coca, "that divine plant, which satisfies the hungry, gives strength to the weak, and makes them forget their misfortunes."

The Indians of the Peruvian Andes are subject to fits of melancholy or are generally of a gloomy temperament. Dr. Weddell, who travelled extensively in South America, and published in Paris, in the year 1853, a work entitled "Travels in the Northern Parts of Bolivia," says, "It is difficult to have lived for any length of time among them without being struck by the expression of concentrated melancholy which can be read upon their features, and which seems to speak of an undefined but constant suffering."

One would have supposed that when the free republics of South America were established the trials of the long-oppressed aborigines would have been at an end, and something like political equality would have prevailed among the different races. But such is not the case. In Bolivia every Indian from 18 to 50 years of age is subject to a poll-tax of $5, if he is a laborer, and from $6 to $10 if he is a proprietor, and this tax is collected half-yearly. No equivalent tax is imposed upon the whites, and from this source alone $4,500,000 are derived, the total yearly revenue of the Republic being but $10,500,000. The unhappy race, therefore, is still ground down by the dominant blood, and the melancholy feeling of inferiority is still perpetuated.

It does not appear, however, that the coca adds to the gloom of the unhappy Indian. On the contrary, he takes it to relieve himself, for the time, from the peculiarities of his temperament and situation. It has come down to him as a relic of the ancient enjoyments of his people, and during the fantasy it produces he participates in scenes and pleasures from which in common life he is altogether excluded. As a relic of the past, he attaches superstitious ideas to the coca, which must triple in his imagination the benefits he receives from it, and its value to him is further enhanced by its being the sole and only distraction which breaks the incomparable monotony of his existence.

There can be no doubt, from the abundant testimony of eyewitnesses and a multitude of writers, that the coca is both salutary and nutritious; in fact, the best gift that the Creator could have bestowed upon the unfortunate Indians. It is of inestimable value to them, for without it they would do nothing with spirit or good-will.

They always carry a bag of the leaves hanging from their neck, and a small flask by their side, filled with lime or wood-ashes, formed of the burnt stems of the Chenopodium quinoa. The manner of employing them is singular and is as follows: The Indian takes a handful of coca leaves out of the bag and withdraws the filaments from them. He then puts them into his mouth and chews them into the form of a ball. He next wets a piece of thin stick, which he introduces into the flask, and on withdrawing it it is covered with the lime or ashes. He then, withdrawing the ball from his mouth, pierces it with the stick in various places, and upon again taking it in the mouth it has acquired a strong and pungent taste. This is followed by a copious salivation, part of which is ejected from the mouth and part swallowed. The ball is retained in the mouth for about an hour, and is then sometimes renewed with another handful of leaves.

They generally take coca three times during the day. The first time, before commencing their work; the second, about the middle of their task, and the third, some time after the completion of their labors.

For a long time the reputed virtues of the coca leaf were scouted as fabulous by most Europeans; but later, the results of experience, the impartiality of the celebrated historians, and the authority of a great number of scientific men, corroborated the facts set forth as to the benefits of this custom among the Indians.

The proprietors of the mining establishments in Potosi and other districts are abundantly supplied with coca, which they distribute to the Indian workmen. The quantity which they give to each Indian is an ounce and a half, with the exception of "holy days," when it is increased to three ounces.

Groups of Indians may be seen on those days, during the hours of rest from their labors in the mines, chewing the coca with as much pleasure and delight as a connoisseur in tobacco smokes a fragrant "Havana." The effects of the coca on the Indian are very remarkable. They are strongly marked in his countenance by a greater brilliancy to his eye and a more animated expression to his features, while he shows more agility in his step and the other movements of his body, and his whole appearance is one of animation and content, as if he had just partaken of a rich repast.

The properties of the coca are variable according to the quantity and mode of administration. It is a stimulant, a tonic, slightly narcotic, and very nourishing. It produces a general excitation of the circulatory and nervous systems, imparting increased vigor to the muscles as well as to the intellect, with an indescribable feeling of satisfaction, without being followed, as in the case of other stimulants, by any feeling of languor or depression! It possesses an agreeable aroma and a flavor similar to that of tea, and like that plant, is frequently employed in the form of an infusion in slight disorders of the stomach. When infused and drunk like tea, it produces a gentle excitement, followed by wakefulness, and if taken strong, retards the approach of hunger, prevents the usual breathlessness in climbing hills, and in large doses, dilates the pupils and renders the eye intolerant of light. It is seldom used in this way, however, but is usually chewed in the form of a ball or quid (as before mentioned), which is turned over and over in the mouth as is done with tobacco. In this way its action is more gradual and prolonged than when the infusion only is taken. It is also very different in its character, because the constant chewing, the continual action of the saliva, and the influence of the lime or ashes chewed along with it, extract from the leaf certain other active ingredients, which water alone does not appear to dissolve when infused after the manner of tea.

Those addicted to the habitual use of coca claim, and not without abundant proof, that the moderate use of the leaf strengthens the gums and preserves the teeth. Taken in the form of an infusion it excites perspiration and soothes those who suffer from asthma. Taken either in infusion or chewed, it assists the functions of the stomach, and cures gripes or colic. Applied externally in frictions or plasters, it allays rheumatic pain. Various authors assert that it cures intermittent fevers, and is a protection against syphilis, which last statement is exemplified by the fact that those addicted to the use of coca are exempt from all traces of this widespread disease!

Sir Robert Christison, of England, has, during the past year, made a number of experiments with the coca leaf, and offers the following conclusions:

First. That taken in quantities of two drachms by healthy persons if has no injurious, unpleasant, or suspicious effect whatever;

Second. That fatigue is removed and prevented from returning;

Third. Its restorative and preventive powers render protracted exercise easy, without any subsequent harm, and

Fourth. It does not impair the appetite or digestion, although hunger, even after long fasting, is taken away for an hour or two.

The Jesuit Father, D. Antonio Julian, wrote a work entitled "The Pearl of America," in which he treats in an extended manner of coca. He asserts that this plant possesses all the useful properties already noted. He cites in support of these, a great number of cases, where jaundice and hypochondria had been cured by it, and relates the case of a missionary, well versed in botany, who had cured this last malady by administering infusions of coca.

He also laments that the coca is not introduced into Europe, instead of tea and coffee. "It is," he observes, "melancholy to reflect that the poor of Europe cannot obtain this preservative against hunger and thirst, and that our working people are not supported by this strengthening plant in their long-continued labors!"

According to Weddell, coca produces a gently excitant effect, with an indisposition to sleep, in these respects resembling tea and coffee. He testifies further that it supports the strength for a considerable time in the absence of food, but that it does not entirely supply the place of nourishment, and probably in this respect also acts like the substances referred to. The Indians while chewing it pass whole days in travelling or working without food, but they eat freely in the evenings after their labors are done. He also states that persons unused to it are liable to unpleasant effects from its abuse, and he knows of instances of hallucinations apparently resulting from this cause.

The Indians, according to Von Tschudi, looked upon the coca as a sacred and mysterious plant. It formed part in their religious ceremonies, and they burned it upon their altars as a pious offering to their deity. The priests chewed it at their prayers to conciliate the benevolence of the gods, and blessed it, to obtain every worldly advantage. The Indians, according to the same author, filled the mouths of the dead with coca leaves for the purpose of securing their salvation; and some have affirmed that this custom still exists among them, and that when an Indian meets with a mummy he kneels down with devotion and places around it a handful of coca leaves.

Like all vegetable narcotics and stimulants, coca, when used in excess, produces deleterious effects upon the system. The inveterate chewer of coca is known at the first glance. His unsteady gait, yellow skin, and sunken eyes encircled by a purple ring, his quivering lips, and his general apathy, all bear evidence of the baneful effects of the coca juice when taken in excess. A confirmed chewer of coca is called a "coquero," and he is said to become occasionally more thoroughly a slave to the leaf than the inveterate drunkard is to spirituous liquors! Its first evil effect is to weaken the digestion; it then gradually induces a disease named the "opilacion." Biliary affections, with all the painful symptoms which attend them in tropical climates, and gallstones are frequent and severe. The appetite becomes exceedingly uncertain, till at length dislike is created for all food! Then dropsical swellings come on, and the patient flies to brandy for relief, and thus drags out a few miserable years till death relieves him. (Pöppig.)

This description is sufficiently repulsive, but it exhibits only the dark side of the picture. A similar representation could be made truthfully of the evil effects of wine or beer in numerous cases, without thereby implying that these liquors ought either to be wholly forbidden or given up. Dr. Weddell states that he met with none of the extreme cases mentioned by Pöppig. "The chewing of the leaf," he says, "produces ill effects sometimes upon Europeans who have not contracted the habit in their youth," and in two or three cases which came under his observation he ascribed to the abuse of it, "the production of a peculiar aberration of the intellectual faculties characterized by hallucinations."

Von Tschudi also, as the sum of his inquiries, says, "Setting aside all extravagant and visionary notices on the subject, I am clearly of the opinion that the moderate use of coca is not merely innoxious, but that it may even be very conducive to health. In support of this conclusion, I may refer to the numerous examples of longevity among Indians, who from boyhood have been in the habit of masticating coca three times a day. Cases are not unfrequent of Indians attaining the great age of *one hundred and thirty years*, and these men at the ordinary rate of consumption, must in the course of their lives have chewed not less than two thousand seven hundred pounds of the leaf, and yet retained perfect health! Even the Indian "coquero," who takes it in excess, reaches the age of fifty years.

It is consumed more abundantly and with less baneful effects, in the higher Andes than in the lower and warmer regions. It is certain that the Peruvian Indians have always ascribed to it the most extraordinary virtues. Clusius, writing in 1605, says that when he asked the Indians why they always had the coca in their mouths, the answer was, that when using it, neither hunger nor thirst annoyed them, while their strength and vigor were confirmed.

A council of the Church condemned it in 1567 as a "worthless substance, fitted for the misuse and superstition of the Indians," and a royal decree in 1569 condemned the idea that coca gives strength as "an illusion of the devil." But these fulminations were of no avail. The Peruvians still cling to their esteemed national leaf, and the owners of mines and plantations, discovering its efficacy in enabling their slaves to perform the heavy tasks they imposed upon them, soon became its warm defenders. Even churchmen at last came to regard it with indulgence and to recommend its introduction into Europe!

Dr. Don Pedro Nolasco, in a treatise published in 1793, insisted upon the advantages which might be derived from the introduction of the plant into the European navies. More recently, Von Tschudi has also recommended it as fitted "to afford a nutritious refreshment to seamen in the exercise of their laborious duties, and to counteract the unwholesome effect of salt provisions," and lately Professor Schlechtendal, who has also written upon the coca, after commending it as "a tonic, soothing and nutritious, as preventing weakness of the stomach, and the obstructions, colic, and hypochondria, to which such weakness gives rise," adds, that "without doubt, the leaves might be usefully employed in Europe."

The following account, written by Mr. E. B. Shuttleworth, is taken from a late number of the *Canadian Pharmaceutical Journal.*

During the past year, and part of the present season, an opportunity has been afforded of testing the merits of coca on a somewhat extensive scale. In the spring of 1876 a number of gentlemen connected with the Toronto (Canada) Lacrosse Club, commenced using coca, with a view to the prevention of the fatigue incident to a game of which violent bodily exertion forms so large a part. The result was so satisfactory, that fifteen or sixteen players, nearly all connected with the first "twelve," used the leaves at all the important matches played during the season. These were some ten in number and sometimes lasted for many hours. As this club held the championship of the world and maintained it throughout, against all comers, Indians and white men, it may well be imagined that the play was of no light character and that the games were very hardly contested. At one of these, which took place in the middle of the summer, the effects of the drug were very strongly marked. The day was exceedingly hot, the thermometer marking 110° Fahr. in the sun. The antagonists of the club were men of sturdy build, of good physique, well trained in the game, and in general, connected with the mechanical trades or with outdoor avocations. In the latter particular they were in strong and apparently unfavorable contrast with the players of the Toronto Club, whose occupations were all of a sedentary character. However, at the close of day, during the short interval of rest between the games, I remarked that the men of the rival club were so thoroughly exhausted that it was with the utmost difficulty they could be roused by the field captain to take part in the concluding game, while the coca-chewers were as elastic and apparently free from fatigue as at the commencement of the play.

At the beginning of every match about a drachm to a drachm and a half of the leaves were served out to each man, this was chewed in small portions during the game, the saliva being of course swallowed. On first taking the leaves, a sensation of heat and dryness was produced in the throat. This was relieved by washing out the mouth or gargling with water, after which the desire for water was no greater than usual. Soon after a sensible augmentation of muscular force and a general feeling of invigoration were realized and continued to be felt throughout the game, so that fatigue was wholly, or in great part, resisted. The pulse was observed to increase in frequency, perspiration was augmented, but no mental effect was noticed, save the exhilaration of spirits always attendant on the exercise of well-strung muscles and on the excitement of play. *No disagreeable after-effects were realized.*

We have no accurate data from which to form an estimate of the actual weight of coca leaf collected and consumed in Bolivia and Peru. One authority gives as indisputable the fact that the annual production and consumption in South America falls little short of one hundred millions of pounds!

Pöppig estimates the money value of the yearly produce to be about four and a half millions of Prussian dollars, which at one shilling a pound, the price it yields to the grower, would make the annual production about fifteen millions of pounds. Between these two extremes the truth is doubtless to be found.

To illustrate further: Dr. Weddell informs us that the province of Tongas, in Bolivia, in which the coca is much cultivated and esteemed, alone produces nine million six hundred thousand Spanish pounds. The total produce therefore is, without doubt, much beyond the fifteen million pounds deduced from the statements of Pöppig. This approximation is sufficient to show us its importance to the higher regions of South America, in an agricultural and commercial, as well as in a social point of view.

The *Chemical History* of the coca leaf is quite interesting. Some investigation has been made of the proximate constituents of the leaf, with results, though not entirely satisfactory, yet sufficient to show that the physiological effects of the leaves are jointly due to *three* different constituents, viz., an odoriferous resinous substance, a fixed alkaloid, and a species of tannic acid (cocatannic) with which the alkaloid "cocaina" is associated in the leaf.

As they reach this country, the leaves are coated with a resinous or waxy substance, which is only sparingly soluble in water, more so in alcohol, and readily so in ether. When the leaves are digested in ether or alcohol, a dark-green solution is obtained, which, on being evaporated in the open air, leaves a brownish resin, possessed of a powerful, peculiar and penetrating odor. When exposed for a length of time to the air, this resinous matter diminishes in quantity, and gradually loses the whole of its smell, leaving a fusible, nearly inodorous matter behind.

Ether or alcohol therefore extracts at least two substances from the leaf, one of which is very volatile, and has a powerful odor. It is probable that in this volatile substance the narcotic qualities of the leaf reside. And this is consistent with the fact that the leaves gradually lose their smell and taste, and, after a lapse of time, say two years, are comparatively inert and worthless. As before mentioned, it is usual to make up the leaves into hard packages covered with fresh hides which shrink and compress the whole as they dry. But notwithstanding this close packing, nearly resembling that of hard-pressed hop packages, they invariably give off their volatile ingredients as do hops, and by transport and keeping continually diminish in value and estimation. The volatile resinous matter, extracted as above, is therefore one of the most important ingredients of the coca leaf.

Various attempts have been made to analyze the coca leaf by different chemists. The most thorough examination seems to be one made by Dr. Albert Niemann, of Goslar (Saxony), who succeeded in isolating a peculiar alkaloid, to which he gave the name *cocaina.* The following is his process: The leaves were exhausted with 85 per cent. alcohol, acidulated with two per cent. of sulphuric acid; the tincture treated with milk of lime and filtered, the filtrate was neutralized with sulphuric acid and the alcohol distilled off. The syrupy residue was treated with water to separate resin, and then precipitated by carbonate of soda. The deposited matter was exhausted by ether, and the ethereal solution, after most of the ether had been distilled, was allowed to evaporate spontaneously. The *cocaina* was then obtained in colorless crystals, mixed with a yellowish-brown matter of a disagreeable odor, which was separated by washing with cold ether.

Pure *cocaina* is in colorless transparent prisms, inodorous, of a bitterish taste, leaving a peculiar numbness on the tongue, followed by a sensation of cold. The alkaloid melts at 208° F., and on cooling congeals into a transparent mass, which gradually assumes the crystalline form. Heated above this point it changes color and is decomposed. It is inflammable, burning with a bright flame and leaving charcoal. With the acids it forms soluble and crystallizable salts, which are more bitter than the alkaloid itself. It was found to consist of carbon, hydrogen, nitrogen and oxygen, and the formula as given by Dr. Niemann is $C_{32}H_{20}N,O_3$. He obtained also wax, a variety of tannic acid (cocatannic), and a concrete, volatile, odorous substance. Others have tried to extract this alkaloid and failed, owing to the mutability of cocaina with acids, and Mr. Lossen recommends in consequence the omission of acids in operating on the leaves, and proposes the following modification of Dr. Niemann's process:

An infusion is first made; this is precipitated with acetate of lead; the lead is removed by sulphate of soda and the liquid concentrated. Carbonate of soda is then added and the whole shaken with ether. The latter extracts the alkaloid and yields it in a crude state by evaporation. It is then purified, as in the process of Dr. Niemann.

Vegetable Wax.—The precipitate occasioned by milk of lime in the alcoholic tincture treated with cold ether leaves on evaporation a soft, sticky, brown mass, soluble in boiling alcohol, from which a white body separates, appearing after repeated solution in hot alcohol as a snow-white granular mass. It fuses at 167° F., is slowly soluble in hot alcohol, readily in ether, and is not acted on by solutions of alkalies or acids. Elementary analysis determined its composition to be $C_{66}H_{66},O_4$. The composition of this body, called *coca wax* by the author, closely corresponds with that of Moulder's grass wax and Syringa wax.

Cocatannic Acid.—After precipitating the cocaina by carbonate of soda, as above, the dark-red filtrate is freed from ether, neutralized by nitric acid, the sulphuric acid removed by nitrate of baryta, the excess of the latter by carbonate of ammonia, and the liquid neutralized by nitric acid; acetate of lead now produces a voluminous, dirty, brownish-green precipitate, which, decomposed by sulphuretted hydrogen, yields a clear yellowish-red solution, of slightly astringent taste, reddening litmus and giving peculiar reactions with certain precipitants.

The filtrate from the precipitate with subacetate of lead yields a yellow precipitate, apparently containing the same tannin partly modified through the influence of the nitric acid.

Odorous Principle.—On distilling one hundred grams of the leaves, Dr. Niemann obtained a slightly turbid distillate, which on redistilling with chloride of sodium yielded white globular masses, lighter than water and possessing the peculiar tea-like strong odor of the leaves.

Professor John M. Maisch, of Philadelphia, has also succeeded in isolating the alkaloid *cocaina.* The following is the process followed by him: Fifteen hundred grains of the coarsely-powdered leaves were exhausted in a funnel-displacer by alcohol mixed with a little sulphuric acid. The dark-colored brown-green tincture was agitated with an excess of milk of lime, which assumed a brownish-green color; the filtrate therefrom together with the washings with cold alcohol were carefully neutralized with sulphuric acid, filtered from the greenish sulphate of lime and distilled. The aqueous residue separated but little resinous matter; the filtrate therefrom was precipitated by carbonate of soda and the alkaloid gained in an impure state by shaking the mixture with ether and evaporating the light straw-colored ethereal solution. The yield was 4 grains, and the alkaloid showed the usual behavior with the customary reagents for cocaina.

Mr. Maisch investigated further, and after isolating the odorous principle of the leaves, allowed it to evaporate spontaneously, which left on the bottom of the vessel a soft resin-like coating. He further says, "The odor of this mass is heavy, narcotic; the taste similar, somewhat acrid; the behavior to test-paper neutral, but, exposed to the damp atmosphere of a rainy day, it had almost completely lost its odor and acquired an acid reaction and taste, and was now easily soluble in water and alcohol. This odorous principle, which I regard as a product of decomposition of some constituent, is, therefore, volatile with the vapors of water in a slight degree, but very changeable, at least in a moist atmosphere. It is likely to be of great importance, as it is stated by several observers that an infusion of the leaves has different properties from the same leaves chewed with an alkali. Whether or not it is nitrogenous, must at present be left undecided."

To further illustrate the indecisive conclusions concerning the proximate constituents of the leaf, I will further quote from Mr. Maisch. (Am. Journal of Pharmacy, fol. 500, an. 1861.)

"It will be seen from these experiments that this uncrystallizable alkaloid had very nearly the same behavior as pure *cocaina*, the principal difference being the reaction with iodine, which with the former is of a somewhat lighter color with a slight yellow tinge. Heat it appears therefore renders it amorphous; what part the water and carbonate of soda take in this change must be determined by experiments with the pure alkaloid (*cocaina*). But it is very likely that the yellowish-brown matter, which Dr. Niemann found so difficult to separate from *cocaina*, is this same alkaloid in an amorphous state. My experiments likewise render it more than probable that the substance named *cocatannic acid* by Dr. Niemann, is a product of oxidation, the original compound of which yields with acetate of lead from a slightly ammoniacal solution no precipitate, but after previous oxidation by the atmosphere, precipitates it, and the precipitate has, according to the length of exposure, a color varying from white to yellow and brown. As it is so readily affected by the atmospheric oxygen, great care is necessary in its separation from the other constituents."

I have closely followed the process of Dr. Niemann, Mr. Lossen, and Prof. Maisch, and while having succeeded in obtaining the alkaloid from the coca leaves, am not fully convinced as to the measure of identity between the *cocaina* and *cocatannic acid*, which seems to be implied in the language of Mr. Maisch. It is to be hoped that subsequent investigations may result in fixing more definitely the place and character of the various constituents of the leaf.

The alkaloid cocaina is not an article of frequent use by the medical profession, although a statement has been circulated of its being made by a chemist of La Paz (Bolivia, S. A.), and given freely in the treatment of intermittents. Its high price (selling in New York for one dollar a grain !) would prevent its frequent use as a remedial agent, and the pharmacist necessarily be driven to resort to less expensive preparations of the drug.

The ready volatility of at least one of the active ingredients, and the susceptibility of its constituents to change and deterioration from exposure to heat or air, point unmistakably to the desirability of fluid extracts or concentrated tinctures, to be made with cold solvents.

It has been my custom to cause the leaves to be ground in a drug mill to a suitable degree of fineness together with one-third their weight of crushed sugar, thereby securing a more ready and uniform comminution of the leaf. The powder was next introduced into a glass jar and covered for twelve hours with a menstruum of equal parts of strong alcohol and water, and then introduced into a percolator and a fluid extract made without the use of heat, expressing strongly at least twice in the process.

I have also made a fluid extract with the employment of an alkalinized menstruum, consisting of half a drachm of bicarbonate of potash added to a pint of diluted alcohol, and the process completed as above. The taste of the result is not so pleasant as in the former process, and the result of the experiments conducted with the fluid extract made in this manner has not been so convincing as to suggest it for the ordinarily made hydro-alcoholic fluid extract.

The dose of the fluid extract is from 20 to 30 drops, to be taken in water, wine, or other spirituous liquor if desired. Elixirs, syrups, cordials, etc., can be readily made by mixing in suitable proportions the fluid extract with syrup, plain or compound elixirs, cordials, etc.

San Francisco, Cal., August 20th, 1878.

III. CHEMISTRY.

ON THE PREPARATION OF CHEMICALS.*

BY JAMES R. MERCEIN.

QUERY 52.—What chemicals may be profitably made by the retail pharmacist, and what apparatus is required for their preparation?

IF the meaning of the word "profitably," in the above query, is to be accepted in its broadest sense, there is no doubt that the pharmacist should be the manufacturer of a very large proportion of the articles upon his shelves. The nice manipulation and accuracy of detail arising from constant practice; the knowledge of chemical results, analytical and synthetical, gained only by personal experience; the satisfaction of knowing that each product contains its proper ingredients, and is not dependent for uniformity upon the chances of keen mercantile competition and its consequent temptations: all these gains have a value beyond estimation. A year's experience upon the Board of Pharmacy of my own State has shown me very conclusively the lamentable lack of practical familiarity with laboratory work among many of the druggists and their assistants. The great majority of them are very intelligent men, but as they have been content to manufacture nothing and buy everything; as they are simply keepers of drug stores, and not pharmacists, their want of pharmaceutical knowledge is painfully evident. And yet a previous apprenticeship, which had included laboratory practice, based upon sound textbooks, would have offered an easy solution of this problem.

In Dickens's immortal Nickleby it is told of Squeers, the rascally Yorkshire schoolmaster, that he was accustomed to train his pupils in orthography by making them put into practice the words they had learned. The boy who mastered "window" was immediately sent to clean it; he who had essayed "horse" was straightway made to groom it, and so on. In this novel way did Squeers mnemonically impress the truth of language upon his scholars and fill his own pockets. This same method, modified, should be adopted in our profession. I believe in the go-and-do-it system: works, not words. Let an intelligent man or boy make with his own hands any pharmacal or chemical compound, from its alpha to its omega; let him see with his own eyes the varied processes from which is evolved the perfect work, and there is an absolute certainty that he will never forget it. Theory, without practice, is useless at all times. In our profession it is as "sounding brass and tinkling cymbals." The profitable side of the query, in a money sense, can be readily demonstrated.

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* Read at the Fifth Session.

During the 12 or 14 hours which most pharmacists are obliged to pass in their stores daily, there are always odd times which can be economically employed in the laboratory; the days not only seem shorter, but the idle moments are coined into money. At the same time, and from the very nature of the case, these otherwise inconsequent fractions cannot be charged as additional items in the cost of production, which is the first step gained in competition with wholesale manufacturers, whose time *is* money, and must be paid for. There is not a day in any druggist's business life in which he cannot devote a little attention to the production of extracts, chemicals, alkaloids, etc.; processes which when once initiated will, in a measure, take care of themselves, or need little attention. In the single item of fluid extracts alone, the economy in cost will average 75 per cent., allowing amply for waste of menstrua, heat, and breakage of apparatus. The experience gained in packing the percolator, the comparative value of maceration before displacement, proportioning the strength of menstrua, these are points which cannot be over-estimated. I assert that a great majority of the officinal processes can and should be regularly used by pharmacists. What is the Pharmacopœia for, if not for this? The fairy tales of science are not for daily use by "horny-handed" druggists. We are very Gradgrinds for *facts.*

The wholesale manufacturer, through long experience, has acquired methods in which ecomony of time and material is a potent factor, and the Pharmacopœia is not needed. But to the retail pharmacists, it should be a *vade mecum.* They are the men for whom it was originally compiled and for whom it is decennially revised. It is not a perfect work by any means, nor is claimed so to be; but like Mercutio's wound, "'t will serve."

Taking, then, this work as a guide, I have carefully selected from it a list of products which any pharmacist, with the appliances already in his store, or at best, by very trifling and inexpensive additions, can make for himself. Theoretically, every working-room should be a complete laboratory, abounding in all manner of helps and contrivances to meet any emergency; but, as a matter of fact, the apparatus in general use is of the most primitive description. But tact will overcome almost any obstacle, and I insist that every article named can be readily and thoroughly made at home with the utensils at hand,—every one mentioned in the Pharmacopœia.

Collodion.
Cantharidal collodion.
Fluid extracts.
Solid extracts.
Syrups.
Tinctures.
Troches.
Ointments.
Wines.
Oleo-resins.
Vinegars.
Plasters.
Liquid preparations of iron.
Ferrocyanide iron.
Lactate "
Oxalate "
Hydrated sesqui-ox. iron.
Sub-carb. iron.
Citrate iron.
" " and ammonia.
Tartrate " "
" " potass.
Citrate " quinia.
" " strychnia.
Biniodide mercury.
Proto- " "
Yellow oxide "
" sulphate "
Ammoniated "
Chalk with "
Iodide lead.
" sulphur.
" arsenic.
Precipitated sulphur.
Exsiccated alum.
" s. iron.

Upon the above list, it is within safe bounds to say, that at least 50 per cent. can be saved to the pharmacist who does his own work. It is a mistake to suppose that expensive or complicated apparatus is needed. Ingenuity will do wonders. What our "down East" friends call "faculty" will effect marvels. Emergencies will tend to develop latent pluck and energy, and difficulties, at first sight unconquerable, will readily yield to perseverance. I thoroughly believe that it is the duty of every pharmacist to be his own purveyor; his duty to save money by not buying what he should make himself; his duty to improve and perfect the pharmaceutical skill of himself and his assistants by these means, and to communicate to his fellow-workers the results of his successful endeavors.

Laboratory work "grows by what it feeds upon," and the pharmacist who may be persuaded to do what this imperfect essay has endeavored to point out, will wonder that he left undone those things which he ought to have done long before.

JERSEY CITY, N. J., August 20th, 1878.

ON UNIFORMITY IN CHEMICAL TERMINOLOGY.*

BY F. MARION MURRAY, M.D.

THE wonderful and rapid development of the sciences during the past century has been largely due to the earnest efforts made by earnest workers towards classification. And the still more wonderful results of the fifty years just past are the outgrowth of the completion of, or improvement on, the plans inherited from the laborers of as many years before. In chemistry particularly we find that the decades are not many since its isolated and indefinite facts presented a state not far removed from "jumble." The secrecy and presumption of the earlier holders of this pittance of knowledge rendered the task of systematizing and arranging it in a tangible form very great, and the position of him who dared to make the attempt unenviable. Occasionally, however, a bright light would seem to appreciate the fact that in the greatest simplicity conformable to accuracy and precision is the higher knowledge, and come out from under his bushel. This was followed by that indispensable to the highest knowledge—uniformity.

The first attempt towards the introduction of a definite spoken language of chemistry is accredited to Macquer and Baumé, who gave the name of *vitriols* to the resultants of the action of vitriolic acid upon metallic substances; and *nitres* to the same obtained by nitric acid.

The greatest advance of early times towards system in terminology was made by Bergmann, in 1782, by designating all metals by names ending in *um*. It has been a lasting one. Since then it has been generally adhered to in naming elementary bodies. Many elements that were discovered and named before its introduction have since been made to conform to it. The chemical name of every element does not possess the desired ending, but occasionally we find some one daring enough to change an old *on* or *ine* to *um;* we gradually accustom our ears to the new sound, our tongues to the new speech, and thus, one by one, they are ushered into line without a revolt or very persistent objection. Had chemistry the earnest and determined friend of uniformity in nomenclature possessed by mineralogy in the person of Prof.

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* Read at the Fifth Session.

James D. Dana, the millennium of *um* would not long be postponed.

Of the sixty-six elements, all the metals have been, by one author or another, terminated by *um* except nickel. In this case reversion to its old name, niccolum, would do no injury. All the halogens, except fluorine, have received the ending *ium*, and to make them uniform, the same suffix should be added to it. It has been given to boron, and silicon changed to silicium. Phosphorus has been called phosphorum. To oxygen and hydrogen the ium has been applied. Only three, nitrogen, carbon, and sulphur have successfully resisted the desideratum. Why they should continue to prevent the complete triumph of this admirable suffix does not appear. The complete adoption of this ending would improve chemical language, but need not seriously affect the popular names now in use.

Mr. Norman Lockyer, who claims to have discovered a new means of resolution, and to be able to prove that many of the now recognized elementary bodies are merely different degrees of condensation of hydrogen, may seriously affect our *um*, but it is well to adhere to it until the destroyer actually appears.

Since brevity and adherence to orthographic rules in the sounding of vowels are always commendable, particularly when easy harmony is a factor, cancelling the final and silent e of the halogens will be a gain. Instead of saying iödine, chlorine (*i* as ē), etc., how much more euphony there is in bromĭn, chlorĭn, fluorĭn, and ïödĭn. General adoption of this would not conflict with Continental languages; they could yet give their alphabetical ē sound to the *i* and save one letter in length.

A more recent "bone of contention" is "what shall the ending of alkaloids be?" Continental European authors seem to prefer the *ine*. This is quite natural, since their *i* being ē gives an easy and musical sound to the names to which it may be suffixed. But it cannot readily become universal because it cannot be made to accord with the English ī; it does not accord with that language, which is more used than any other civilized tongue; which holds commercial sway; and whose growth is not yet ended. And but few, very few, are uniform in its use. Really seeming to use what appears to them to be the most popular. Other objections are: turpentine has the same ending; coloring matters, as carmine, carthamine, etc., are so ended; it is a common and much used ending, and not distinctive. The *ia* has been in use for a long time, and its application has not been very varied. In 1857, Mr. G. C. Foster proposed it as a termination for the nitrides of the yl, ene, and ise compounds. Its euphony and general adaptability strongly recommend it for universal adoption. The view held in regard to the relative position of alkaloids, that they are derivatives of one or more molecules of ammonia (NH_3), is an argument in favor of the adoption of *ia*. They would all have the same ending of a common parent. Since it is so seldom used in other channels, its general adoption here would be easily accomplished, and it would retain its distinctiveness. I would restrict alkaloids to it, and it to alkaloids. Then chemical compounds completing their names with *ia* would at once be known as alkaloids, excepting, of course, the common parent. It may be objected that the institution of the suffix *a* was to conform the vegetable with mineral alkalies; but if it is still desired to continue the conformity with the change of chemical views, it can easily be done by dropping the *a* and adding the *um*. But this I do not conceive to be necessary, or even desirable.

Some difficulty may be experienced in cases where the common name already has the ending in *ia;* as in lobelia and sanguinaria. We must remember here, however, that the only *chemical* product is the alkaloid. I know of only these two conflicting instances. The error of giving one for the other in these instances, when called for in a prescription, is not apt to occur, because these alkaloids are rarely, if ever, used in medicine. Our national standard, the U. S. Pharmacopœia, has adopted it. Recent English and American authors have adopted, and are adopting it. They, however, use also the *a* only, as in lobelina, nicotina, etc. I would change them to lobelia and nicotia. Adhere to *ia*. Disuse the *a* alone. Make the *ia* distinctive for true alkaloids; *a* never—*ia* always and ever. Give to *i* the short sound, *a* is in father.

But a little need be said about the glucosides. The uniformity of the suffix *in* is quite general for these. Here the ending is not distinctive. We must bring definite knowledge to bear in many instances. Under this head I take occasion to deprecate the tendency of giving names to new results in the organic laboratory on too slight proof. Definite names should not be bestowed until the presence and nature of a new substance are substantially proven. Resins and resinoids should be called such, coupled with the name of the plant from which they are derived. The use of the "eclectic preparations" should be discouraged, and their libellous names sunk deep into the sea.

A commendable practice has recently made its appearance among authors and teachers in dropping the final and silent *e* of the pseudo-sugars—as mannĭt for mannĭte, dulcĭt for dulcĭte, quercĭt for quercĭte, etc. In all such principles the final *e* should be cancelled, and the last *i* given the short sound. The ĭte has been generally conceded to the mineralogists. Nearly all this species take that ending, and it ought as a scientific termination to be left to them exclusively.

In securing the uniformity pointed out, help is needed. The teacher will do his share, but his field is limited to those who are in attendance upon lectures; the author will do his share, but he is limited to those who read what he writes. We need the assistance of a class, not often appealed to as educators, but who are such to a greater extent than they may think. I refer to manufacturing chemists and wholesale druggists. The instances are not few in number where the bottles of the aforesaid are used as shelf bottles, just as they are sent out. They reach those who cannot attend lectures, and those who will not read. By them the labels on said bottles are accepted as correct; sometimes even taken as authority in orthoëpy (sad sometimes, too!). Here in our hall we have an instance of contrary spelling between two of the largest manufacturing firms in the United States. One adopts the *ia;* the other the *ine* in terminating the English names. The larger manufacturer, however, has the right of it. Through the sources asked for aid, correct spelling and uniformity could soon be introduced. To them we appeal! Please correct the spelling in your next order for labels.

The author knows that this subject, as here presented, is too briefly treated, and feels that it is illy done, but if it should arouse others more capable to action, his hopes will be fulfilled.

COLORS FOR CANDIES.*

BY S. P. SHARPLES.

QUERY 10.—Confectioners frequently use deleterious substances for coloring candies. How can harmless colors, suitable for their use, be made.

IF consulted in regard to the confectionery to be used and the matter to be used in coloring it, my advice would be somewhat similar to Punch's celebrated advice to people about to get married, don't use any. But, the public, and those who humor it, insist both on having their candy and on having it colored, and the most that we can do is to prevent their poisoning themselves any faster than is necessary.

Pure sugar, taken in moderate quantities, is not only harmless but often beneficial, and is well known as a good heat producer and is easily assimilated and stored up in the body for future needs in the form of fat. Used in excess it acts injuriously, producing acidity of the stomach, and destroying the teeth.

The bad effects of sugar-eating in excess, appear to follow even more quickly upon the use of candy, and many samples of candy have been found to exercise a distinctly poisonous effect.

These poisonous effects may be traced to the colors and essences employed in their manufacture, and the deleterious effects of these are quite frequently aided by the acid used to give the sugar a pleasant acid flavor. Take for instance the common old fashioned *sour* ball. This is composed of sugar, tartaric acid or cream of tartar, and oil of lemon, for the *interior*, and is surrounded by strips of the same material colored, perhaps by some of the aniline dyes.

A more valuable dose for increasing the profits of the doctor, dentist, and apothecary would be hard to contrive.

Another favorite form of confection is the so-called lozenge, cut about the size of a nickel, and rolled perhaps in arsenic paper. I have found enough arsenic in the paper surrounding a single roll of these lozenges to kill a full-grown man, to say nothing of the copper associated with it. The lozenges themselves are often about as bad as the paper, the yellow ones being quite generally colored with chromate of lead, and they are all apt to contain as much "terra alba," which is the trade name for gypsum, as the conscience of the maker will allow. And so wedded are many of the manufacturers to the good old ways of their fathers, that it is almost impossible to get them to change from hurtful preparations to those that are comparatively harmless. A prominent manufacturer of this city was recently indicted for using chromate of lead as a coloring in lemon lozenges. While in trouble he applied to me for a yellow color that should be harmless. I furnished him with a fustic lake, which was almost the desired shade, but slightly more inclined to orange than what he had been using, but he declined to use it on the pretext that it would spoil the sale of his lozenges, and kept on with the chromate because he knew just how to use it, and it gave the desired shade; and he escaped conviction on the technical ground that the law only provided for articles of food, and a confection was not an article of food.

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* Read at the Third Session.

The colors used for confectionery must possess certain qualifications. They must be reasonably permanent. A color that quickly fades or changes in the light is of no use. They must not be easily affected by acids or alkalies, litmus, for instance, is not suitable, since it is easily changed in color from red to purple and the reverse.

Turmeric makes a handsome yellow in acid preparations, but fades quickly and is turned to a dirty brown by alkalies, such as supercarbonate of ammonia, which is frequently used by confectioners. A dealer in butter, some time ago, got into considerable trouble with his customers by using turmeric as a coloring matter. When they undertook to make sponge, or some other fancy cake, with it, the cake instead of being a golden yellow was a muddy brown; he traced this to the fact that they used carbonate of ammonia to make the cake light.

Annatto gives a yellow which borders too closely upon orange to be acceptable to the confectioners, and is never used by them, so far as I know. It is largely used by butter and cheese makers, and is generally regarded as perfectly harmless.

The fustic lakes give good, bright yellow, but much of the powdered sugar used being ground in iron mills, contains traces of iron, and this acts injuriously on the yellow, turning it brown.

I have never succeeded in preparing good yellow lakes with flavine or the coloring matter of quercitron or black oak bark, since these pass with great readiness into the dingy modifications.

Saffron is too expensive for general use, and yields but little color. Persian and French berries are harmless, but seem to be inferior to fustic.

The reds are more decided colors than the yellows, and we have less trouble in finding acceptable ones. The old standard cochineal and its lake carmine have never been improved upon for this purpose. Brazilwood and its lakes answer a very good purpose, but are harder to obtain than carmine, and the color is rather more fugitive. For light pinks the madder lakes answer a very good purpose.

Purple is not much in demand, but madder or logwood purples are harmless and may be intensified with a little indigo.

For blue, indigo or indigo carmine may be used.

Sap green is sometimes used, but it does not produce a very brilliant color, and a mixture of fustic and indigo is preferable.

In regard to the aniline or coal tar colors, authorities differ, one set saying that the colors are not injurious, and that if any injurious effects have been observed from their use they have arisen from the impurities in the colors, and not from the colors themselves. But, with the exception of arsenic, they have failed to point out what these injurious impurities are, and in throwing the blame on arsenic they have over-proved their case, for the worst samples reported contain but a few per cent. of arsenic, and as three or four grains of the color would be a large amount to be taken at one time, the amount of arsenic could not exceed the tonic dose, and could not at all approach the tragic dose.

I am inclined to the belief that many of these aniline colors have well-marked poisonous characters of their own, and I would in no case use or recommend their use in articles of food, although they have such powerful tinctorial powers that three or four grains of almost any of them are sufficient to tint a pound of sugar.

The same remark also applies to the tin lakes of the various dye-woods. They may be harmless, and they are certainly very bright and handsome, but we know far too little of their effects on the system to use them in articles of food. In order to show what articles have been found as coloring in confectionery, I give from Hassall the following list, which he condemns for the purpose. These substances are almost all of them active poisons, and yet many of them may still be found in use by confectioners.

The colors which should never be used in articles of food, and the use of which should be prohibited by law, are the following:

Yellows.

Gamboge.
Chromates of lead.
Litharge.
Yellow orpiment.
King's yellow (sulphides of arsenic).
Iodide of lead.
Sulphide of antimony.
Sulphide of cadmium.
Yellow ochre.
Or any other mineral yellows.

Reds.

Red lead, minium or red oxide of lead.
Vermilion, or sulphide of mercury.
Red orpiment, realgar or sulphide of arsenic.
Mercuric iodide.

Red earths, such as venetian red, indian red, etc., although these last are comparatively harmless, acting merely as foreign substances in the intestines.

Browns.

Vandyke Brown.
Umber, burnt umber.
Terra del sienna, and various other oxides of iron.

Purples.

All purples in which any of the prohibited reds and blues are used.

Blues.

Prussian blue, soluble blue.
Antwerp blue.
Cobalt blue.
Smalt.
Blue verditer.

Ultramarine. (In the small quantities in which this substance is used in whitening confectionery and sugar, it is probably as harmless as any blue that can be used.)

Greens.

Mineral green, or carbonate of copper.
Verdigris.
Emerald green, Paris green.
Schweinfurt green, or aceto-arsenite of copper.
Brunswick greens, or oxychlorides of copper.

The various bronze powders, as these all contain copper. And to these we may add the various aniline colors and picric acid.

This list of condemned articles seems a long one, but many of the articles on it have been found in common use by confectioners in this country. The leaves used to decorate cakes are commonly made of paper well loaded with arsenic.

Carbonate of lead has also been found in confectionery.

BOSTON, July 24th, 1878.

ON THE PREPARATION OF SALTS OF BERBERINA.*

BY J. U. LLOYD, CINCINNATI, OHIO.

QUERY 26.—How can the salts of Berberina be most easily prepared from the root of Hydrastis Canadensis? What will be the practical yield, and what are the solubilities of the different salts?

OF the many processes investigated, I suggest the following as applicable to small amounts. Owing to the slight yield of this yellow alkaloid, it is hardly advisable for experimenters to work lots of less than ten pounds of hydrastis.

Moisten sixteen troy ounces of hydrastis canadensis in fine powder, with eight fluid ounces of alcohol; press firmly into a cylindrical percolator not exceeding three inches in diameter, previously prepared for percolation; cover the surface of the powder with a piece of blotting-paper, held in position with a few fragments of glass; add alcohol until the percolate appears at the exit, then close the orifice, cover the top of the percolator tightly by tying over it a sheet of soft rubber, and place the percolator in a warm situation; macerate twenty-four hours; remove the rubber and replace with a cover of glass or tin. Cautiously open the exit, and graduate the dropping so that the passage of each fluid ounce will occupy about thirty minutes. Suspend the operation when five fluid ounces have been obtained. Macerate until the next day under the former conditions, and again procure five fluid ounces of percolate, observing the preceding directions. A continuous supply of alcohol must be provided. The surface of the powder must not become exposed during the operation. Mix the percolates; surround the vessel with ice, and reduce the temperature; then add sulphuric acid in excess and stir well. Keep the mixture cold for twelve or more hours, then pour it upon a muslin strainer or a filtering-paper, and when the liquid ceases to pass, return the precipitate to a vessel containing eight fluid ounces of cold alcohol; mix well together and again separate the crystalline precipitate of impure sulphate of berberin. Dry by exposure to atmosphere.

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* Read at the Fourth Session.

Sulphate of Berberina.—Add one part of impure sulphate of berberina, obtained as above, to sixteen parts of cold distilled water, and cautiously drop in, with constant stirring, ammonia water until in slight excess, allow the mixture to stand in a cool place from twelve to twenty-four hours, then filter and surround the vessel containing the filtrate with ice, and stir sulphuric acid into the solution until the ammonia and alkaloid are saturated. In a few hours the magma of minute crystals of sulphate of berberina can be separated with a muslin strainer or a filtering-paper. Care must be taken to avoid an excess of sulphuric acid. If this occur, the moist magma should be removed to a vessel containing cold alcohol, washed by decantation, and drained on a muslin strainer. Lastly, dry the salt by exposure to atmosphere.

Sulphate of berberina is of an orange color, soluble in about 100 parts of water, temperature 60° to 80° F. It is readily decomposed by alkalies when in solution, yielding free berberin.

I obtain from eighteen to twenty-one ounces from a hundred pounds of hydrastis. The specimen of salts exhibited represent the sulphate of berberina from a fifteen hundred pound batch of root. This batch yielded very nearly three hundred ounces. Although the exhaustion was incomplete, with economy I could not carry the percolation farther.

Sulphate of berberina is permanent: exposure to atmosphere does not affect it. If moisture be absorbed, either the salt is impure from hygroscopic extractive matter, or free sulphuric acid.

Berberina.—Rub eight parts sulphate of berberina in a Wedgewood mortar, cautiously adding ammonia water until in slight excess. Pour the dark liquid into thirty-two parts of boiling alcohol and allow the mixture to stand thirty minutes, then filter. Stir into the filtrate thirty-two parts cold sulphuric ether, and cover tightly. Surround the vessel with ice and allow it to stand from twelve to twenty-four hours, then separate the magma of minute crystals of berberin with a muslin strainer or filtering-paper and dry by exposure to atmosphere.

Berberina is lemon-yellow when pure. It should not be dark or orange, which shades denote impurity. It unites directly with acids, and is a beautiful organic base. It forms salts, some of which are very soluble, as for example, the pyrophosphate, others almost insoluble. I find it impossible to make one part of carbazotate of berberina dissolve in forty-five thousand parts of cold distilled water. Berberina and all its soluble salts are bitter. The carbazotate will not impart a trace of bitterness to distilled water, notwithstanding its constituents are both intensely bitter; therefore I believe it to be almost, if not absolutely, insoluble.

Berberina is soluble in about four and a half parts of water, temperature 60° to 80° F. It dissolves moderately in officinal alcohol, is insoluble in ether and chloroform. It changes to orange color when heated to 150° F., and slowly resumes its original shade when cooled.

Phosphate of Berberina.—Dissolve berberina in its weight of boiling water and add two parts of dilute phosphoric acid, drain and dry the precipitate by exposure to atmosphere. Care must be taken that the acid be made from phosphorus, and perfectly free from nitric acid.

The orthophosphate is, according to Mr. Lord, soluble in 280 parts of water.

Hypophosphite of Berberina.—This salt may be prepared by substituting, in the above formula, hypophosphorous acid for phosphoric. Hypophosphite of berberina is soluble to the extent of from five to ten grains in the ounce of water.

Muriate of Berberina.—Dissolve berberina in sixteen times its weight of distilled water and cautiously stir in hydrochloric acid until in slight excess; drain the precipitate and dry by exposure to atmosphere.

Muriate of berberina was the first preparation of this alkaloid introduced to the medical profession from hydrastis. It was discovered accidentally. It is soluble in about five hundred parts of water 60° to 80° F., scarcely soluble at all in cold alcohol, ether, and chloroform. It is the most difficult of the berberina salts to decompose, holding its acid in presence of alkalies, and even long digestion with litharge fails to thoroughly remove it. Oxide of silver at once frees the berberina from a heated solution. When dry it is changed from the natural light lemon color, to orange, by a heat of from 130° to 150° F. Upon cooling the lemon color is resumed. It is rapidly falling into disuse, giving place to the more soluble salts.

Nitrate of Berberina.—This salt can be obtained by substituting nitric acid for the muriatic acid of the preceding formula. It is of greenish-yellow color, soluble in about five hundred parts of water, temperature 60° to 80° F.; more soluble in hot water; scarcely soluble in alcohol, ether, or chloroform. Its use is limited.

Remarks.—Alcohol extracts from hydrastis canadensis in addition to berberin, a greenish fixed oil, an acrid resin, a white alkaloid, a vegetable acid, yellow coloring matter, and small amounts of other substances of little interest here. The materials named are intimately associated or combined while in the root; such combinations being broken up by the addition of the acid, resulting perhaps simply in the formation of sulphate of the white alkaloid, *hydrastia*; sulphate of the yellow alkaloid, *berberina*, and the liberation of the resinous substances, coloring matter and acid.

The yellow sulphate of berberina quickly crystallizes, carrying down some of the other materials, the larger amount of the latter, however, remain in solution. This impure sulphate of berberina is difficult to dry even if well washed, the reason being the mechanical admixture of the oil alluded to, consequently at this stage it has a greenish cast, and imparts an unctuous feeling when rubbed between the fingers.

Sulphate of berberina is decomposed by alkalies with the liberation of the alkaloid berberina. When we add ammonia water in slight excess to a mixture of the impure sulphate of berberin and water, sulphate of ammonium is formed, which dissolves, together with the liberated berberina, an alkaloid very soluble in water and alkaline solutions. The slight excess of ammonia precipitates the hydrastia in an amorphous state, which, with the adhering resin and oil, are separated by filtration; afterwards sulphuric acid, added to the filtrate again, forms sulphate of berberina, which crystallizes. This is pure enough for all practical purposes. It contains a small amount of sulphate of ammonium and a little foreign matter. It can be purified further if desirable by repeating the last operation, dissolving in hot alcohol and crystallizing. For practical purposes this is unnecessary.

When ammonia water is added to sulphate of berberina the salt is decomposed with formation of sulphate of ammonium and the liberation of berberina. Both substances remain in solution, the berberina imparting a dark-red color. The addition of the hot alcohol precipitates the larger portion of the sulphate of ammonium, and when the filtrate containing the berberina is poured into sulphuric ether, that alkaloid crystallizes in consequence of its slight solubility in ether, and a mixture of alcohol and ether. The impurities may be traces of sulphate of ammonium.

The other salts, simply combinations of berberina and the acids, do not require mention. Almost any salt may be produced in like manner by the substitution of various acids.

I have met with little success in endeavoring to obtain berberina by evaporation of a solution of the alkaloid, unless by spontaneous evaporation. The heat of expanded steam 150° to 180° F. seeming to decompose it.

Fixed Oil of Hydrastis.—After separating the sulphate of berberina from the tincture, add to the liquid its bulk of water and evaporate the alcohol. Allow the residuum to remain in a cool place some days and carefully skim off the green oil which collects on the surface of the water associated with a little resin. It can be purified by dissolving in sulphuric ether.

This oil has a disagreeable odor and taste, but is not bitter. It turns reddish brown by age. (See specimen 31.)

Volatile Oil of Hydrastis.—In addition hydrastis contains a very small amount of volatile oil, which imparts the peculiar odor of the root. It may be procured in minute quantities by distilling water in contact with the root.

Resinous Substances.—Decant the aqueous solution from which the oil was separated, and at the bottom of the vessel will be found a black tarry substance, thickly interspersed with yellow particles. Usually a yellow shining layer covers the top. This consists of resin, a little oil, and mixtures of both the white and yellow alkaloids, with the resin and yellow coloring matter. Perhaps a combination exists between this substance and the alkaloids which settle with it. It is difficult to separate them by simply washing in hot water, which should scarcely be the case if they are disassociated; inasmuch as the sulphates of both alkaloids are quite soluble in this menstruum, wash the precipitate well and dry. The black resinous substance is acrid to the taste, slightly soluble in hot water and dilute acids, soluble in concentrated sulphuric acid, to which it imparts a deep red color, and from which it is separated by the addition of water. It may be a mixture of several proximate principles.

In some respects this substance reminds us of the amorphous material obtained from cinchona, known as chinoidine, and it may perhaps be largely composed of a principle from hydrastis, bearing a somewhat similar relation to hydrastia that chinoidine bears to the crystallizable alkaloids of the cinchonas.

Hydrastia.—This white, or yellowish-white alkaloid exists as sulphate in the liquid decanted from the last-named preparation. It is associated with small amounts of all the preceding substances and a soluble vegetable acid. To obtain it add an alkali, preferably ammonia water, in excess to the cold liquid, and allow the brown or brownish-yellow percepitate to settle; then decant the supernatant liquid and wash the precipitate with cold water. Add cold water enough to the drained precipitate to bring to the original volume, and then slight excess of sulphuric acid. Allow it to stand in a cold place twenty-four hours and filter. To the filtrate add an alkali in excess and wash the precipitate as before. Dry the precipitate, dissolve in boiling alcohol, filter, and crystallize. These crystals are of a deep dark-yellow color. They are not bitter, but impart a disagreeable acrid sensation to the throat and fauces. The yellow color results from the intimate admixture of a yellow substance, very soluble in acid solutions, and imperfectly in neutral and alkaline. It is not berberina.

Purify hydrastia by dissolving in a dilute acid, digesting with animal charcoal and filtering, repeating the operation several times. Or dissolve the crystals of impure hydrastia in boiling alcohol and crystallize, repeating the operation several times. Specimens of small hydrastia crystals, apparently white, are found to be yellow when crystallized in large masses. It is very difficult to obtain an article free from yellowness if the crystals be large. I have none.

Hydrastia is insoluble or nearly insoluble in water, freely soluble in cold chloroform and to an extent in cold alcohol, very soluble in boiling alcohol, from which it crystallizes in beautiful crystals. It forms salt with acids, mostly very soluble in water, uncrystallizable or crystallizing with difficulty.

These incidental products are of little general interest to manufacturers as only berberina salts are in demand.

I have already digressed from the direct line of my query. I will close by saying that there is a doubt in my mind as to the relations of these several principles while associated in the plant. I cannot believe they are as simple as we might expect and is generally believed. I doubt even if berberina and hydrastia are not mutually combined with other bodies. The splitting up of these organic compounds under the influence of chemical agents, drying the plants, and the action of solvents, is with me very obscure.

PURIFICATION OF STRYCHNIA FROM BRUCIA.*

BY ALBERT B. PRESCOTT.

The Pharmacopœia recommends treatment with diluted alcohol. Mr. A. D. Smith found that strychnia was soluble in about 500 parts alcohol, sp. gr. .941, and brucia in about 22 parts. It seemed that there was too great a loss of strychnia, and it was attempted to ascertain the amount of loss. Four trials were made.. The amount of strychnia dissolved by the alcohol (sp. gr. .941) after one hour's digestion, was found to be 12.6 per cent., 9.2 per cent., 12.6 per cent., and 8.6 per cent.

The solubility of the strychnia was very greatly decreased by diluting the alcohol still further. The alcohol was diluted to sp. gr. .970. It required 2617.5 parts of this alcohol (sp. gr. .970) to dissolve 1 part of strychnia, and 37.3 parts of same to dissolve 1 part of brucia. To apply this fact in the separation of the two alkaloids, a known amount of pure brucia was mixed with an equal amount of strychnia, 50 parts of alcohol (sp. gr. .970) added, the mixture agitated, allowed to stand 1 hour, filtered, and the filter washed with as much more of the alcohol. The alcoholic solution, after evaporation, gave only a slight indication for strychnia. The strychnia remaining in the filter, after dissolving in chloroform, gave no test for brucia.

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* Read at the Fifth Session.

Ten samples of *commercial strychnia* were treated in this way, with alcohol sp. gr. .970. All but two gave tests for brucia. The following is a table showing the results:

Sample.	Amount taken in grams.	Residue, after washing with alcohol, sp. gr. .970.	Weight of the residue after evaporating the alcohol.	Per cent. of alkaloid dissolved by alcohol, sp.gr. .970.	Test for brucia.
1	125	.120	.004	.32	Distinct.
2	.1415	.140	.0005	.36	Slight.
3	.1545	.152	.001	.64	Distinct.
4	.121	.120	.0005	.4	Very slight.
5	.150	.1485	.001	.66	Slight.
6	.150	.148	.0015	1.00	Distinct.
7	.170	.169	.0005	.29	No test.
8	.120	.115	.004	3.33	Distinct.
9	.130	.1285	.001	.76	Slight.
10	.140	.139	....	....	No test.

UNIVERSITY OF MICHIGAN, SCHOOL OF PHARMACY,
November 4th, 1878.

MORPHIOMETRIC PROCESSES FOR OPIUM.*

BY ALBERT B. PRESCOTT, M.D.

THE following Pharmacopœial Assay Process for Opium is submitted to the Committee of Revision:

Opium, when dried [in powder] at [about] 100° Centigrade (212° Fahrenheit) until it ceases to lose weight, should yield [from ten to twelve?] per cent. of morphia.†

The proportion of morphia may be determined by the following process: Take of opium, in powder and dried as above required, six and a half grams (100.3 grains); lime, freshly slaked with one-third its weight of water, three grams (46.3 grains); chloride of ammonium, in powder, four and a half grams (69.4 grains); benzole [see List of Reagents] fifty cubic centimeters (the volume of 772 grains of water); washed ether [List of Reagents] six cubic centimeters (the volume of 92 grains of water); distilled water, seventy cubic centimeters (1080 grains), or a sufficient quantity. Place the opium in a paper filter of four inches (10 centimeters) diameter, in a small funnel; add benzole to fill and cover the powder, and when the filtrate begins to drop, close the neck of the funnel and leave to macerate one hour. Then percolate, by adding the remainder of the benzole, and dry the filter and its contents at a gentle heat until the odor of benzole has disappeared. Carefully transfer the contents of the filter (which is to be preserved) to an exactly weighed flask, of the capacity of 100 to 120 cubic centimeters, add the lime, with 20 to 30 cubic centimeters of distilled water, agitate for several minutes, then stopper the flask and shake till a uniform mixture is obtained. Add distilled water enough to make the contents of the flask weigh seventy-four and a half grams (1149.7 grains). Digest, by immersing the flask in nearly boiling water, with occasional agitation, for one hour. Cool, and add distilled water to restore the exact weight of 74.5 grams. Filter, through the paper filter previously used, into a test-tube or other cylindrical glass of the capacity of eighty to ninety cubic centimeters and previously marked for the volume of fifty cubic centimeters (771.6 grains of water), until the filtered liquid reaches the mark. Should the filtrate lack a few drops of the required volume, the filter-contents are gently pressed to bring the liquid to the mark, but in any case no more than this volume is received. To the filtered liquid (now representing five grams of the opium), add eight drops of the benzin, and three cubic centimeters of the washed ether (the volume of 46 grains of water), then stopper the tube and agitate. Add the chloride of ammonium, and when it has dissolved, agitate again, and set aside in a cool place for three to three and a half hours. The crystalline deposit is now gathered by filtration, in a small filter previously weighed and moistened, collecting the deposit and washing the filter with several portions of distilled water, using but a few drops in each portion. The filter-contents are now dried at about 50° Centigrade (122° Fahrenheit), washed with the remainder of the washed ether

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* Read at the Fifth Session

† I would suggest, as others have done, that opium ought to be limited in maximum as well as in minimum strength. The Pharmacopœia can hardly depend upon commercial interest *always* to carry over-rich opium to the morphia manufacturer. But I am not confident as to what limits should be fixed, and it seems to me that a requirement permitting a variation of only 2 per cent. is more strict than can be enforced.

(three cubic centimeters), dried again and weighed.* The weight represents the morphia in five grams (77.16 grains) of opium. The per cent. is found by multiplying the weight in grams by 2, or by dividing the weight in grains by 0.7716.

The plan of Mohr: The use of lime solution in excess to dissolve morphia from opium or its infusion, and the use of ammonium chloride to neutralize the lime and precipitate the alkaloid—a plan corresponding to the successive use of potassa and ammonium chloride for aluminium separation—has been well approved by the best authorities for the practical assay of opium. It has been adopted in the British Pharmacopœia, with exhaustion of the opium with water before adding the lime, and with acidulation with hydrochloric acid and then evaporation, before adding ammonia to throw down the morphia. The addition of a little ether and benzole to hasten the crystallization of the morphia, and especially to prevent the crystals from adhering to the sides of the dish, was recommended by Hager (Phar. Centralhalle, Jg. 9, No. 1, u. 2), and the process so executed was designated Hager's later process. Hager directed to deduct one-tenth the weight of the crystalline precipitate for impurities. In view of the fact that some of the narcotina is dissolved by the lime solution, and crystallizes with the morphia, Jacobsen advised to wash the dried crystals with chloroform; this suggestion, with preference of ether instead of chloroform, Hager accepted, directing the deduction of one-thirtieth for impurities. Hager's-Jacobsen's process, with the lime solution of five grams of opium all washed through the filter (and consequent concentration of the filtrate) is chosen by Dragendorff, in his "Werthbestimmungen starkwirkender Droguen" (1874), p. 93, as the best process for practical uses, and only second to Schacht's process, with correction by amyl alcohol extraction and volumetric estimation, for a method of greatest exactness. Then Hager devised the improvement of taking six and a half grams of opium, and having sixty-five grams of water in the lime solution, taking the first fifty grams of filtrate, to represent five grams of the opium, thereby *avoiding the washing of the filter and the concentration of the filtrate*, saving the morphia from waste by wet heat, and shortening the operation. This form of Hager-Jacobsen's process is given in Hager's "Untersuchungen," II, 176; also in Hoffmann's "Examination of Medicinal Chemicals," p. 268. I submit the process, very nearly as given in the two works last named, but with addition of the preliminary treatment with benzole, for the consideration of the Committee of Revision.*

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* Hager (after Jacobsen) directs to *subtract from this weight its one-thirtieth* for impurities (not removed by ether washing of the morphia pre.). In his process, however, there is no treatment of the opium with benzole. This treatment with benzole lessens the impurities of the morphia weighed, and probably wastes some morphia (not over $\frac{1}{2000}$ of the weight of the benzole used). The subtraction of one-thirtieth is more fully discussed, farther on.

With the desire to contribute some proof of the comparative exactness of different processes of morphiometric assay, I have instituted a series of comparative trials, each process being applied in turn to each one of a set of samples of opium, holding the conditions as nearly parallel as possible. Then, as a test of each result, the purity of the morphia was estimated volumetrically by Mayer's solution, and the morphia remaining uncrystallized in the mother liquor was sought to be extracted by amyl alcohol and estimated volumetrically; these means of correction, the one against overvalue and the other against undervalue, being essentially those which were proposed and used by Dragendorff, in his "Werthbestimmungen starkwirkender Droguen." All the operations here reported were intrusted to the execution of Mr. Henry Stecher,† and I desire to acknowledge, still farther, the benefit of his counsel, in conducting the work, throughout the investigation.

The following named processes were tried:

A. The process here proposed for the U. S. P., Hager-Jacobsen's, with a preliminary treatment of the opium with a limited quantity of cold benzole.

B. The same, Hager-Jacobsen's process, modified in treatment of the opium at the start with a *sufficient* quantity of hot benzole.

C. Hager-Jacobsen's process, as given by Hager, without initiatory treatment of the opium with benzole. The results being taken before as well as after washing the morphia with ether.

D. Procter's Staples's process (Am. Pharm. Asso. Proceed., 1870, p. 130), the plan of the preparation of morphia by U. S. P., 1870, with initiatory treatment of the opium with benzole.

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* A strong approval of Hager-Jacobsen's process, by Dr. Schlosser, is given in the Am. Jour. Phar., 1871, p. 224.

† Mr. Stecher has been Assistant in the Chemical Laboratory at Michigan University; his present address is Minneapolis, Minn., care of Gray and Hofflin.

E. Schachtrupp's process for estimation of morphia and narcotina (Zeitschrift für Analyt. Chemie, 1868, vii, 509). The plan of this method consists in exhaustion of the opium, made alkaline and dried, with hot benzole, the benzole solution being evaporated and its residue dissolved in acidulated water and titrated with Mayer's solution, for narcotina, when the benzole-washed opium is exhausted with amyl alcohol, this solution evaporated, and its residue taken up in acidulated water, and ammonia added, for the crystallization of the morphia, so estimated, gravimetrically. The morphia gravimetric results of this process, as of the others, were subjected to volumetric trial.

Four of the samples of opium used were obtained at different drug stores in Ann Arbor, and one was taken from the laboratory stock, all being "powdered opium." The samples were all dried at 100° C., till drying ceased to diminish the weight. Except for process C, only four samples were worked in the trial of each process.

A. *The process proposed by the writer, for the U. S. P.*, as described at the beginning of this paper, Hager-Jacobsen's process, with initiatory treatment of the opium with a limited quantity of benzol not heated. The results represent 5 grams of opium (6.5 grams being taken), as the directions stipulate. Corrections were undertaken, by volumetric estimation of the precipitates, and also of the amyl alcohol extract of the filtrates, with Mayer's solution of potassium mercuric iodide, as described in detail below :

Process A.

	Percentages.				
	No. 1.	No. 2.	No. 3.	No. 4.	Mean
a. Crystalline precipitate of crude Morphia,*	12.20	13.10	12.32	12.05	12.42
b. Ether-washed morphia,	10.74	11.94	11.84	11.68	11.55
c. By estimating *b* with Mayer's solution,	7.40	8.80	8.48	8.80	8.37
d. From filtrate, by amyl alc. and Mayer's sol.,	2.12	1.92	2.76	3.21	2.50
e. Total morphia by Mayer's sol. $(c + d)$,	9.52	10.72	11.24	12.01	10.87
f. Subtracting from *b* $\frac{1}{30}$ (Jacobsen),	10.38	11.54	11.44	11.29	11.16
g. Subtracting from *a* $\frac{1}{10}$ (Hager),†	10.98	11.79	11.09	10.85	10.18

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* The weight of these precipitates were, respectively for the four samples, 1st, 0.610, 2d, 0.655; 3d, 0.616; 4th, 0.6025 grams.

† Hager's direction to subtract $\frac{1}{10}$ from the crude precipitate and take the remainder for morphia, as well as Jacobsen's direction, accepted by Hager, to subtract $\frac{1}{30}$ from the ether-washed precipitate and take the remainder as the morphia, were both given for processes without initiatory benzole-washing of the opium.

The quantities of benzole used upon the opium in this series of trials were larger than the directions specify, being, for No. 1, 100 cc.; for No. 2, 80 cc.; for No. 3, 80 cc.; for No. 4, 70 c.c. Even these quantities did not complete the removal of color by the benzole, the last portions being still slightly colored. The reason for restricting the quantity of benzole, and using it cold, is given under Process B.

For *estimation with Mayer's solution*, the volumetric potassium mercuric iodide, the *precipitates* were dissolved in sulphuric acidulated water, and so diluted that, at the final reaction in titrating, the solution should be about 200 parts to 1 part of morphia (as Dragendorff advises). Mayer's solution* is made by dissolving 13.55 grams mercuric chloride, and 49.84 grams potassium iodide, both strictly dry, in water to make 1 liter. The solution is, therefore, twentieth normal (old decinormal) of $HgCl_2 + 6KI$. Mayer gave the value of 1 cc. of the solution as 0.020 of alkaloid. Dragendorff reports trials giving (in solutions of 200 to 1) 0.0224, and 0.0221, of crystallized morphia, and of morphia dried at 120° C., 0.0191 and 0.0205, respectively, for 1 cc. Again, 0.020 of crystallized alkaloid. The precipitate is not insoluble in water; therefore a uniform dilution of 200 to 1 is advised. If 4 molecules of morphia salt react with 3 molecules of the iodomercurate [$(KI)_2$ $HgI_2 + 2KI$?], then 0.0202 should be the value of 1 cc. of the solution, in crystallized morphia, $C_{17}H_{19}NO_3 \cdot H_2O = 303$, no allowance being made for the solubility of the precipitate in water. Dragendorf has stated that the precipitate was visible in a solution of morphia salt in 2500 parts of water. From all the evidence at command, and some trials with crystallized morphia, I believe that titration of morphia with Mayer's solution, at 0.020 alkaloid to the cc., gives results certainly not too high, and possibly a little too low; also that these results of titration are closer than can be obtained gravimetrically by methods of purification of the crystals. Nevertheless, more investigation is needed as to the conditions of accuracy in titrating with Mayer's solution.

The final reaction was found by patiently waiting for the precipitate to subside after each addition liable to be final, then taking a drop with a glass rod, upon a glass plate resting on black color, and adding thereto a drop from the burette. If a precipitate appears, these drops are rinsed from the glass plate, into the solution, with a drop or two of water.

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* F. F. Mayer, Pro. Am. Pharm. Asso., 1862, x, 238; Am. Jour. Pharm., 1863, xxxv, 20; Chem. News, 1863, 159. George Dragendorff: Werthbestimmungen starkwirkender Droguen (1874), 9; Gerichtlich-chemische Ermittelung von Giften (1868), 227.

In undertaking *to exhaust the mother liquors* (the filtrates) of their remaining morphia,* the following plan, after Dragendorff, was adopted: The crude morphia was filtered out, at the time specified by the process, and the filtrate set aside some time longer, for additional crystallization of morphia. The precipitate so obtained was filtered out, washed slightly with water, dried, and washed with ether, dissolved in sulphuric acidulated water, and titrated with Mayer's solution. The opium filtrate (from the morphia precipitate) was then shaken in a large test-tube with amyl alcohol, and the separated alcohol removed, three portions respectively of 15, 10, and 5 cc. of amyl alcohol being so applied, each portion being heated in a mixture. The united amylic solutions were then evaporated to dryness, the residue dissolved in sulphuric acidulated water, and this solution titrated with Mayer's solution. The following results were obtained: In the work with Nos. 1 and 2, after treatment with ammonium chloride, the solutions were left twelve hours, and in Nos, 3 and 4, four hours, instead of the "three to three and a half hours" of the process, for the precipitate to form.†

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* The solubility of morphia in pure water is about one milligram to one cubic centimeter, and Cleaver (Phar. Jour. and Trans., vii, 243, 1876), advises to add to the weight of purified morphia crystals, one-thousandth of the weight of all the water of the mother liquors and washings, to compensate for the morphia so held in solution. It is of interest to note that this correction, with the fifty grams of mother liquor in the Hager-Jacobsen process, just makes $\frac{1}{10}$ the morphia of U. S. P. standard opium, the correction formerly advised by Hager to be deducted for impurities (see result *g* of Process A, above). But it has been clearly shown that opium mother waters, even when non-alcoholic, dissolve more morphia than pure water does. Cleaver states that "solutions of opium from which the morphia has been precipitated, if allowed to stand until the smell of ammonia has disappeared, will redissolve large quantities of morphia." If, however, much excess of ammonia is left in the liquid, the amount of dissolved morphia is much greater (Phar. Jour., 1876, vii, 242).

† Dragendorff reports, from Mr. Fricker's work (Werthbestimmung., 92):

1. Morphia by Hager's process, 5.9 p. c.; by three days' cryst., 0.3 p. c.; by amyl alc., 1.06 p. c.
2. " " 5.8 p. c.; " " 0.85 p. c.; " " 0.73 p. c.
3. " " 7.3 p. c.; " " 1.27 p. c.; " " 0.56 p. c.
4. " " 6.24 p. c.; " " 0.80 p. c.; " " 0.46 p. c.
5. " " 0.38 p. c.; " " 0.07 p. c.; " " 0.62 p. c.

Supplementary to Process A.

	Percentages. No. 1.	No. 2.	No. 3.	No. 4.	Mean.
a. Additional precipitates, estim. by Mayer's sol.,	0.36	0.20	0.80	0.28	0.41
b. From last filt. by am. alc. and Mayer's solution,	1.76	1.72	1.96	2.93	2.09
c. Total additional, as given in A, *d.*, . . .	2.12	1.92	2.76	3.21	2.50

B. *Process A, Modified by the Initiatory Treatment of the Opium with Hot Benzole.*—Each portion of the opium was digested, with heat, for one hour, with 35 cc. of benzole, then washed on a filter with a little benzole, dried, and worked thereafter as directed in the process first given in this paper. The following results were obtained:

Process B.

	Percentages. No. 1.	No. 2.	No. 3.	No. 4.	Mean.
a. Cryst. precipitate of crude morphia,* .	10.82	11.80	11.66	10.32	11.15
b. Ether-washed morphia, . . .	10.26	11.18	11.08	9.84	10.59
c. By estimating *b* with Mayer's solution,	7.20	7.60	7.40	6.92	7.28
d. From filtrate, by amyl alcohol and Mayer's solution, ...	3.08	2.72	3.60	3.72	3.28
e. Total morphia by Mayer's solution, .	10.28	10.32	11.00	10.64	10.56
f. Subtracting from *b* $\frac{1}{30}$ (Jacobsen), .	9.92	10.81	10.71	9.51	10.28
g. Subtracting from *a* $\frac{1}{10}$ (Hager), . .	9.74	10.62	10.49	9.29	10.04

Comparison between Results of A and B.

	Percentages. Mean of A.	Mean of B.
a. Crude morphia, ...	12.42	11.15
b. Ether-washed morphia, ...	11.55	10.59
c. By estimating *b* with Mayer's solution, ...	8.37	7.28
d. From filtrate, by amyl alcohol and Mayer's solution, .	2.50	3.28
e. Total morphia by Mayer's solution, ...	10.87	10.56

It appears, then, that the use of hot benzole, instead of cold benzole, upon the opium, causes lower gravimetric results and lower results of the sum of the volumetric estimation. Result *b* is lower with each sample, as well as in the mean, from the use of hot benzole. The ether-washed morphia is purer in process A than in process B; the former giving of the mean 72.47 per cent., and the later only 68.84 per cent. of absolute morphia, by Mayer's volumetric estimation. Finally, the morphia precipitation is more nearly complete with process A than with process

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* The weights of these precipitates were, in grams, for No. 1, 0.541; No. 2, 0.590; No. 3, 0.583; No. 4, 0.516.

B; the former giving in the precipitate a mean of 77.00 per cent. and the latter a mean of 68.94 per cent. of the total morphia obtained by volumetric estimation. According to Cleaver (*Pharm. Jour. Trans.*, 1876, vii., 240), morphia is soluble in 2000 parts of benzole, at ordinary temperatures. The results of process B here seem to show that, when hot, benzole dissolves more morphia. The morphia volumetric yield is 0.0155 gram less after treatment with 35 cc. hot benzole than after treatment with 50 to 100 cc. cold benzole.

I will not venture to surmise why hot treatment, with benzole, should make the precipitate less pure and less complete, but it was found, not only in the mean, as above stated, but in each of the 4 samples, the hot benzole treatment gave precipitates less pure and less nearly complete. Therefore, it appears inadvisable to use the benzole hot. And, because morphia is not without waste by cold benzole, the quantity to be used is limited, in the process recommended.

C. *Hager-Jacobsen's Process, as given by Hager, without Initiatory Treatment of the Opium with Benzole.*—(Hager's Untersuchungen, ii, 176.) The materials and directions are essentially the same given in the proposed U. S. Pharmacopœia process, at the beginning of this paper, except that only 8 drops of benzole are taken, and the initiatory treatment with benzole is omitted. The time of formation of the morphia precipitate was limited to 3 to 3½ hours. As with processes A and B, the crude morphia was weighed, then ether-washed and again weighed; and comparisons are given with crude morphia, minus $\frac{1}{10}$, and then ether-washed morphia, minus $\frac{1}{30}$. The precipitates were estimated volumetrically, and additional precipitates were obtained by 24 hours' standing, and volumetrically estimated, but, I regret to say, the final filtrates were not exhausted with amyl alcohol.

Process C.

	Percentages.				
	No. 1.	No. 2.	No. 3.	No. 4.	Mean.
a. Crystallized precipitate of crude morphia,	9.96	14.14	12.80	10.28	11.79
b. Ether-washed morphia, ...	8.82	12.34	11.82	9.30	10.57
c. By estimating *b* with Mayer's solution, .	7.80	8.60	8.20	6.60	7.80
d. From additional precipitate by Mayer's solution, ...	0.80	0.24	0.80	0.40	0.56
e. Total precipitates, by Mayer's solution, .	8.60	8.84	9.00	7.00	8.36
f. Subtracting from *b* $\frac{1}{30}$ (Jacobsen), .	8.53	11.93	11.54	8.99	10.21
g. Subtracting from *a* $\frac{1}{10}$ (Hager), .	8.96	12.72	11.52	9.25	10.61

Here the gravimetric mean result of ether-washed morphia is lower than in process A, and nearly the same as in process B. The additional precipitates contain, in the mean, 0.56 per cent. against 0.41 per cent. in process A. Of the morphia in the last mother liquor (filtrate), no estimation was made. By the volumetric estimation of the ether-washed precipitate it was, in the mean, 73.79 per cent. of morphia, a little purer than by process A (72.47 per cent.), and purer than B (68.84 per cent.). Judged by processes A and B (and D), the precipitation in C was deficient in No. 1, and notably impure in No. 2. Process C makes No. 2 to be 3.52 higher in per cent. than No. 1, A giving the difference 1.20, and B only 0.92 (for ether-washed morphia). The omission of the initiatory treatment with benzole leaves the opium-lime mixture loaded with the opium-wax and renders the filtrations more difficult and the entire operation less satisfactory. Indeed, one might say that the trouble of using the benzole was compensated for simply by the greater neatness of all the work afterwards.

D. *Procter's Staples's Process* (Pro. Am. Pharm. Asso., 1870, p. 130; Am. Jour. Pharm., 1871, p. 65; the first of the three methods tried by Procter).—The plan of the U. S. Pharmacopœia preparation of morphia modified by the washing of the opium with benzole.

The proportion of benzole used was 50 cc. for the 100 grains of opium, the quantity taken by Procter. The benzole was applied by maceration in a filter and percolation, as directed for the proposed U. S. Pharmacopœia process. Following the proportions and directions used by Procter, the following results were obtained:

Process D.

	Percentages.				
	No. 1.	No. 2.	No. 3.	No. 4.	Mean.
a. Crystallized precipitate of crude morphia,*	15.52	15.89	15.28	14.00	15.17
b. Ether-washed precipitate,	14.91	14.87	14.54	13.28	14.40
c. By estimating *b* with Mayer's solution,	11.20	11.11	11.60	10.40	11.08
d. From filtrates, by amyl alcohol and Mayer's solution,	Results not satisfactory.				

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* No. 1, from 2.5 grams opium, 0.388 crude morphia; No. 2, 3.24 of opium, 0.517 crude morphia; No. 3, 2.5 of opium, 0.382 crude morphia; No. 4, 2.5 of opium, 0.350 of crude morphia.

The results with Staples's process were so evidently incorrect that I give them only as a confession of failure, the cause of which Mr. Stecher and myself had not time to investigate. In my own hands, and in the hands of those working under my instruction, Staples's process has usually given results rather lower than Hager-Jacobsen's. In this case the quantities of the samples were small, as given in the foot-note, but the balance was delicate and the work seemed satisfactory. The crude morphia was beautifully crystallized and of light color, as is usual from Staples's process. I can only surmise that the "ether-washed morphia" contained something beside morphia, which can react with Mayer's solution. The results of working the filtrates were still less satisfactory. The filtrate from No. 1 was exhausted with amyl alcohol, this solution evaporated to dryness, the residue dissolved in sulphuric acidulated water, when it took 7.5 cc. of Mayer's solution, indicating 6.00 per cent. of morphia. Then, with Nos. 3 and 4, the amyl alcohol residue was dissolved, as before, in acidulated water, this solution made barely alkaline with ammonia, and a bulky, light-colored precipitate obtained. Filtered out and dried, the precipitate turned dark, coherent and waxy. Dissolved in acidulated water, the No. 3 solution took 3.5 cc. of Mayer's solution (giving 2.80 per cent. morphia), and the No. 4 solution took 4.5 cc. of Mayer's solution (indicating 3.60 per cent. morphia). The ammoniacal filtrates from these precipitates, last above named, were washed with benzole, then acidulated and titrated, when that of No. 3 took 3 cc. of Mayer's solution (2.4 per cent. morphia), and that of No. 4 took 2.3 cc. Mayer's solution (1.84 per cent. morphia). These benzole washings, evaporated, and their residue dissolved in acidulated water and titrated, used for No. 3, 1.8 cc. Mayer's solution (indicating of narcotina, 1.53 per cent.), and for No. 4, also 1.8 cc. (same per cent. narcotina given by No. 3).

I would advise, in extracting filtrates from Staples's process with amyl alcohol, first to exhaust them with benzole, as was done for the estimations tabulated below. Narcotina, when free, is sufficiently insoluble in water, but narcotina, partially combined, may dissolve in the water solution of opium to a notable extent. If the crude morphia of process D, *a*, was loaded with narcotina, the ether washings have been insufficient to remove all narcotina, and the weights, *b*, may have represented this impurity.

May there be something beside alkaloids which precipitates Mayer's solution, obtained in the amyl alcohol extract from Staples's filtrates (though not so obtained from filtrates of Hager's process)? Dragendorff calls attention to the fact, that an aqueous extract of opium contains substances, aside from known alkaloids, which precipitate Mayer's solution, whatever those substances may be. Some results of the titration of water solutions of opium, acidulated with sulphuric acid, were found to correspond to 50 and 60 per cent. of morphia (Werthbestimmung., p. 88). Again, titrating ammoniacal filtrates from opium, Dragendorff reports that when additions showing 19 per cent. and 21 per cent. of morphia had been made, the precipitates were still incomplete. Certainly no results so widely out of the way are obtained by titrating the amyl alcohol extract (a method used by Dragendorff himself), but it is desirable to know more positively whether amyl alcohol (always aqueous) takes up anything at all to precipitate Mayer's solution beside alkaloids. The work recorded in the next paragraph was entered upon before this question had defined itself in our investigation; but, although undertaken as a measure of the morphia left in Hager's filtrates and Staples's filtrates, and not as a test of the accuracy of amyl alcohol extraction, nevertheless it may be said that the results have such reasonable proportions as to do credit to the amyl alcohol extraction by which they were obtained.

Comparative Estimation of the Morphia remaining in a set of the final Filtrates of Hager's Process and of Staples's Process.—The estimation being done by Mayer's solution applied to amyl alcohol extracts, and the extraction with amyl alcohol, being preceded with benzole washing in case of the Staples's filtrates. These filtrates were obtained in a set of assays of tincture of opium, done by Mr. Henry Heim, in parallel operations by Hager's and Staples's process.* The work upon the filtrates,

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* Valuation of tincture of opium, twelve samples, in parallel assays by Hager's process and Staples's process, reported by the writer from works by Henry Heim See.

The earlier process of Hager was used, differing from "Hager-Jacobsen's," in taking only 5 grams of opium (or the residue by evaporating an equivalent quantity of tincture), washing the residue into the lime-opium solution, and concentrating the latter to about 25 grams before adding the ammonium chloride (and benzole and ether), then leaving 24 hours for precipitating the crude morphia. Dragendorff's Werthbestimmung., 91. For Staples's process, that done by Mr. Stecher, were as follows: The filtrates of Staples's process were first exhausted with two successive portions of benzole; those of Hager's process were treated directly with the amyl alcohol, the total alkaloid so obtained being estimated as morphia. In every case, the amyl alcohol was used in three portions, successively, of 15 cc., 10 cc., and 5 cc.,—30 cc. in all, each portion being shaken with the opium filtrate, in a tube, the mixture left to separate, and the clear amyl alcohol layer drawn off. The united amyl solutions were evaporated to dryness on a steam-bath, the residue dissolved in sulphuric acidulated water, and this solution titrated with Mayer's Solution. The results were as follows:

From Filtrates Left in Valuation of Opium Tinctures.

	WITH HAGER'S PROCESS.			WITH STAPLES'S PROCESS.		
No.	Filtrate.	Morphia.	Morphia, per cc.	Filtrate.	Morphia.	Morphia, per cc.
1	45 cc.	0.046 gm.	1.02 milligm.	40 cc.	0.100 gm.	2.50 milligm.
2	50	0.100	2.00	40	....	....
3	33	0.060	1.82	40	0.110	2.75
4	40	0.070	1.75	35	0.062	1.77
5	38	0.080	2.10	30	0.090	3.00
6	40	0.060	1.50	35	0.096	2.74
7	40	0.096	2.40	40	0.108	2.70
8	35	0.094	2.70	36	0.072	2.00
9	35	0.052	1.51	37	0.080	2.16
10	40	0.094	2.35	....	....	....
11	....	....	....	....	....	....
12	40	0.090	2.25	....	....	....

Mean morphia per cc. for 8 Nos. omitting 2, 10, 11, 12; Hager's, 1.85 milligrams; Staples's, 2.45 milligrams.

For the total 436 cc. of 11 Nos. with Hager's process, the mean was 1.93 milligram morphia per cc. of filtrate. The solubility of morphia in water, and to a greater extent in the mother liquor of morphiometric assays, even when no excess of ammonia is present, has been alluded to in a foot-note under Process A. As the filtrate of Staples's is alcoholic, it ought to dissolve more morphia than the filtrate of Hager's process. Taking the solubility of morphia in pure water as 0.001 gram per cc., it is indicated by this work, that Hager's filtrates dissolve, in the average, 1.9 times more than water does (the extreme being 1.02 times,

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given by Procter, Pro. Am. Phar. Asso., 1870, 131, was followed, evaporating tincture to one-half, and proceeding as directed, but leaving four days for the crude morphia to precipitate.

and 2.4 times); while Staples's filtrates dissolve, in the average, 2.45 times (in extremes, 1.77 times, and 3.0 times) more than water dissolves.

As having a bearing on the comparison of Hager's process with Staples's it may be quoted here that Mr. Heim's gravimetric results, in valuation of tincture of opium, give, as the average with the 12 samples, by Hager's process, 3.103 grains ether-washed morphia per fluid ounce of tincture; by Staples's process, 2.84 grains morphia per fluid ounce of tincture.

E. *Schachtrupp's Process for Estimation of Morphia and Narcotina.*—(Zeitschrift für Analyt. Chemie, 1868, vii, 509.) A weighed amount of opium [5 grams], is covered in an evaporating dish (porcelain), with a solution of sodium cabonate, heated on the water-bath, and when semifluid, evaporated to dryness. The dry mass is transferred to a perfectly dry beaker or flask, covered with benzole, agitated and heated moderately, then decanted on a filter, and the residue treated two or three times with portions of benzole and filtered. [The quantities of benzole were not stated by Schachtrupp. The solubility of morphia in benzole has been discussed under "Process B." It is advised to use, in all, about 40 cc., for 5 grams opium, but a good deal more was used in our operations.] (The benzole solution is reserved, for estimation of the narcotina.) The dried filter with its contents is now added to the residue in the flask or beaker, and the whole warmed to expel the last trace of benzole. Amyl alcohol is now added to the dry residue, in the flask, the mixture stirred and heated to near boiling, and while hot decanted upon a filter, adding successively two more portions of amyl alcohol. [Schachtrupp does not specify how much amyl alcohol to use.] Set the mixed filtrates aside for a few hours. Decant from crystals of crude morphia; distil the solution to its one-third; add dilute hydrochloric acid, in the retort, and shake. Remove the amyl alcohol, the upper layer (from the water solution of morphia hydrochlorate, below); wash the decanted amyl alcohol with two or three additional portions of the dilute acid; and pour the united acid water solutions upon the crystals of crude morphia, previously separated, to dissolve them. [Schachtrupp does not give strength or qualities of the dilute hydrochloric acid. Mr. Stecher used 4 portions, and found the last to take up a notable proportion of morphia. Dragendorff states that all the morphia can hardly be obtained in this way. It would be better to evaporate the amyl solution to dryness, and then dissolve in acidulated water, as done by Mr. Stecher in extracting mother liquors with amyl alcohol drescribed under Process A.] The acidulated water solution of morphia is now evaporated on the water-bath, to a weight double that of the opium taken, filtered, the filtrate treated with ammonia in slight excess, covered loosely, and set aside for 24 hours. The precipitate (at first bulky and afterward growing crystalline), is collected on a filter, washed several times with distiled water, and dried and weighed. [The gravimetric morphia of this process retains considerable color.] The reserved benzole solution is evaporated to dryness, the residue dissolved in sulphuric acidulated water, and the solution titrated for narcotina, with Mayer's solution. Each cc. of the latter precipitates 0.0213 gram narcotina.

The following results were obtained by Schachtrupp's process:

Process E.

	Percentages.					
	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	Mean
a. Colored morphia, precipitate,	7.53	8.82	11.16	10.27		9.44
b. By estimating *a* with Mayer's sol.,	4 80	5.60	10.20	10.00	7.00	7.52
c. Benzole alkaloids, by Mayer's solution, estimated as narcotina,	14.91	10.44	9.58	9.80	9.04	10.15

Flückiger and Hanbury mention percentages of narcotina, from 1.30 to 10.30. Dragendorff gives results for narcotina, from 8.8 to 14.7 per cent. (Werthbestimmung., 83.) As previously mentioned, Mr. Stecher used more benzole than should be used, and considerations of the benzole solubility of morphia make it certain that a notable proportion of morphia was obtained with the narcotina.* No work was done to separate morphia from the other alkaloids dissolved by the benzole; and it can only be declared that the results are untrustworthy, and the process of Schachtrupp an inexpedient one.

The trial of Process E gives additional evidence that *the initiatory treatment of the opium with benzole* cannot be used to remove all the narcotina, while leaving all the morphia behind. To dissolve all the narcotina, which is partly held in feeble combination, alkali must be added,† as in Schachtrupp's process, and then the use of enough benzole to take out the wax, etc., seriously diminishes the morphia. The office of the benzole is to free the opium of caoutchouc-like matter, color, etc., and the additional service of making it unnecessary to purify the crude morphia crystals seems to be more than benzole can accomplish. The advantages of preliminary benzole treatment appear from the results of Process C, wherewith they have been named. As to the results by the use of the benzole hot, see Process B. It can hardly be said that the benzole treatment is very important; but as it is otherwise required in the Hager-Jacobsen process, the preliminary use of the agent does increase the number of materials to be taken.*

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* Benzole dissolves narcotina, codeina, papaverina, and narceina (slightly).

† Obtaining, by Mayer's solution, from the benzole extract of a sample of dried opium (not made alkaline), 2.3 per cent. of narcotina, I found from the similar extract of another portion which was made alkaline, 3.3 per cent. of narcotina.

The purification of the crude morphia crystals is best done, I believe, by the ether, non-alcoholic or water-washed. I suggest to put *water-washed ether* in the list of reagents, unless otherwise included, with direction to wash shortly before use, because any pharmacist can, from any grade in stock, in a few minutes, make a uniform quality of ether, free from those common impurities most objectionable for use as a solvent, alcohol and acetic acid, the latter derived in keeping.

With the Hager-Jacobsen process as proposed for the Pharmacopœia, I regret the unavoidable length of the directions, giving an appearance of complexity, perhaps forbidding to the pharmacist. In the execution of the process there is nothing difficult; all the operations define themselves sharply and satisfactorily; and there is little more weighing and much less waiting than in other processes. Some features of leading processes may be compared as follows:

Process.	Quantity of filtrate to 1 of opium.	Time required.
Hager-Jacobsen's,	1 to 10	5 to 6 hours.
" with benzole prelim. treatment,	1 to 10	6 to 8 hours.
Staples-Procter's,	1 to 6 or 7 (alcoholic),	48 "
British Pharmacopœia,	1 to 2½	50 "

As to the purity of the morphia weighed, considered with the incompleteness of its extraction, and as to deducting a fraction for impurities, I would only add to what is given under "Process

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* I hardly need mention that Mr. William Procter recommended the adoption of the benzole treatment, referring to its use by Flückiger, and that the modification (of the Staples process) very properly bears the cognomen due to Mr. Procter's important report on morphiometric methods.

A," a remark of Dragendorff (Werthbestimmung., 92), to the effect that, for ordinary purposes, the foreign substances left in the (chloroform-washed) crystals by Hager's process may be left to balance the loss in mother liquor and washings.

The reports made by careful analysts in different parts of the world render it evident that exact morphiometric methods for opium have not been attained, and the obstacles in the way toward exactness appear only the more apparent in the work I have undertaken. Indeed, absolute exactness is rarely if ever reached in human science. We must be patient with imperfection, always measuring our results by the truth beyond them, as nearly as we can, and we must work heartily for the uses of mankind with such approximate measures as we have.

University of Michigan, July 19, 1878.

THE VALUATION OF TINCTURE OF OPIUM.*

BY ALBERT B. PRESCOTT, M.D.

Twelve samples were obtained, each from a different drug store in Michigan: 3 in Ann Arbor, 3 in Detroit, 3 in East Saginaw, and 3 in Grand Rapids; the best tincture being asked for in each case.

Each sample was worked by Hager's process (as given in Dragendorff's Werthbestimmung. einiger starkwirkender Droguen, p. 91), and by Staples's process, as used by Procter (Pro. Amer. Phar. Asso., 1870, p. 131; Amer. Jour. Phar., 1871, p. 65). I would refer to the report of L. M. Rice (Pro. Amer. Phar. Asso., 1871, p. 447), and to that of D. C. Dott (Phar. Jour. Trans., 1876, Sept. 16, p. 239). All the operations here reported were done by Mr. Henry Heim, to whom this report is indebted for faithful work and careful study.

The process of Hager, modified for the tincture and in other details, was conducted as follows: The specific gravity of the tincture was taken and a weighed quantity (from 25 to 30 grams) evaporated to nearly dryness on the water-bath; 1 gram of freshly slaked lime was added, with trituration, then 24 cubic centimeters of distilled water added, and the mixture heated on the water-bath for 1 hour. The whole was then transferred to a small filter, previously wetted, the residue of the filtration washed with warm water until the filtrate dropped nearly colorless, and the filtrate evaporated on the water-bath to about 25 grams. The liquid was then transferred, with rinsings, to a small wide-mouthed bottle, and while it was still warm 1 cubic centimeter of ether and 3 drops of benzole were added with shaking, then 1.1 grams of ammonium chloride added and dissolved, and the mixture set aside 24 hours. The liquid was then agitated, the crystals detached from the interior of the bottle, the whole brought upon a small filter, previously dried and weighed, the crystalline residue washed with about 8 cubic centimeters of distilled water, dried at about 50° C. (= 120° F.), and weighed.

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* Read at the Fifth Session.

Hager directed to leave the mixture 3 hours for separation of morphia. He has also advised to deduct $\frac{1}{10}$ for impurities in the crude morphia of the process (the crystals not being washed with ether or chloroform). But the filtrate, about 25 grams, if holding only $\frac{1}{1000}$ of its weight of morphia in solution,* would carry about 0.025 of the alkaloid, fully as much as the $\frac{1}{10}$ for foreign substances weighed with the morphia. Now when 24 hours are given for crystallization of morphia, there can scarcely be less than 1 part of morphia remaining in 1000 parts of the filtrate. It is not likely, however, that $\frac{1}{10}$ the weight of the crystals (not ether-washed) is as much as the impurities. It will be seen from the results given with Staples's process that the ether-washing alone removes a variable quantity, averaging not far from $\frac{1}{10}$ the weight of the crystals, and ether-washing certainly does not leave absolute morphia. I should advise ether-washing of the crude morphia, in this Hager's process for the tincture, and then leave remaining impurities to balance the morphia remaining in the filtrate.

The process after Staples was conducted as follows: The tincture (about 25 grams of ascertained specific gravity) was evaporated to ½ its bulk, on the water-bath, then set aside 24 hours for the tarry matters (soluble in alcohol but not in water) to subside, and decanted upon a filter, the filtrate being received in a small wide-mouth bottle. The tarry residue was washed with 4 cubic centimeters (about 1 fluid drachm) of water, and the washings filtered into the previously obtained filtrate. To the clear liquid in the bottle was added an equal bulk of alcohol, of specific gravity of 0.835, and then a mixture of 1.3 cub. cent. (20 minims) of water of ammonia (sp. gr. 0.96) with 1.7 cub. cent. (25 minims) of alcohol. After agitation the bottle was closed with a stopper and set aside for 4 days. The liquid was then agitated, the crystals detached from the side of the bottle, and the whole filtered upon a small filter, previously dried and weighed. The last portion of crystals was rinsed from the bottle upon the filter, with a little of the filtrate. The crystals were then washed with 4 cub. cent. (1 fluid drachm) of diluted alcohol, then with the same measure of distilled water, then dried at about 50° C. (= 120° F.), and weighed. The dried crystals were then washed with 8 cub. cent. (2 fluid drachms) of washed ether, dried at 50° C., and again weighed.

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* See Report of Volumetric Estimation of Total Alkaloids, as Morphia, in the Filtrates, of this work, with Hager's process, in the writer's article on Morphiometric Processes for Opium.

The directions in Staples's process are to leave 24 hours for crystallization of the morphia, and to add the ammonia in two portions; in both which particulars the process was departed from.

Morphiometric Work with Tincture of Opium.

WITH HAGER'S PROCESS.

No.	Sp. gr.	Tincture taken, grams.	Crude morphia, grams.	Morphia, per cent. of tincture.	Grains morphia (crude), per fluid ounce of tincture.
1	0.957	28.730	0.2560	0.891	3.88
2	0.959	27.910	0.1494	0.535	2.81
3	0.959	26 984	0.1998	0.740	3.22
4	0.962	27.112	0.1809	0.670	2.88
5	0.955	28.630	0.2187	0.763	3.31
6	0.969	27.860	0.2970	1.08	4.88
7	0.959	26.100	0.1800	0.689	3.00
8	0.944	27·774	0.1890	0.681	2.92
9	0.952	27.870	0.1845	0.662	2.58
10	0.958	27.700	0.2268	0.755	3.43
11	0.950	....	....	....	....
12	0.950	25.338	0.0837	0.330	1.42
Mean,	0 956	....	....	....	3.11
U.S.P. standard (officinal morphia),			....	0.867	3.75

WITH STAPLES'S PROCESS.

No.	Tincture taken, grams.	Ether-washed morphia, grms.	Morphia, per cent. of tincture.	Grains morphia, per f. oz.	Grams lost in ether-washing.
1	25.608	0.214	0.835	3.64	0.019
2	28.200	0.167	0.595	2.81	0.034
3	28.010	0.180	0.642	2.69	0.027
4	27.965	0.159	0.568	2.48	0.016
5	28.870	0.251	0.862	3.78	0.026
6	28.045	0.265	0.944	4.16	0.019
7	28.175	0.195	0.692	3.01	0.026
8	27.505	0.117	0.422	1.82	0.014
9	28.935	0.176	0.608	2.55	0.016
10	28.028	0.223	0.795	3.47	0.021
11	29.302	0.158	0.539	2.32	0.018
12	26.120	0.115	0.440	1.89	0.013
Mean,	....	....	....	2.84	....

The process of Hager, it will be seen, takes less time than that of Staples, but the time depends greatly on the period given for formation of morphia crystals. By long standing a slightly greater yield is obtained.*

I have for some time been of the belief that Staples's process was the best for tincture of opium, but as Mr. Heim's results somewhat strengthen the comparative usefulness of Hager's process, I must hold it as nearly or quite as good as the other. Staples's process yields the best crystals of morphia.

UNIVERSITY OF MICHIGAN, July 20th, 1878.

ON THE METHODS OF DISTINGUISHING THE ALKALOIDS OF CINCHONA BARK FROM EACH OTHER.†

BY S. P. SHARPLES.

THE separation of a small amount of the other alkaloids from quinia and even their quantitative determination is not a very difficult matter. Liebig's method answering sufficiently well for most purposes, and the method proposed by De Vrij, answering for more refined investigations. But when the question of detecting a few per cents. of quinine in a large percentage of the other alkaloids arises, the question becomes much more difficult, more especially if at the same time we wish to distinguish between quinia and quinidia.

During the past four or five years I have paid much attention to this subject with only negative results so far.

It has been assumed by most, if not all writers, that ether serves to completely extract all the quinia and quinidia from a mixture of all the alkaloids. A number of experiments I have tried upon this separation seem to me to throw doubts upon this point. For instance, when I have made a mixture of 10 per cent.

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* The filtrates of Mr. Heim's work were extracted with amyl alcohol (preceded by benzole washing in case of Staples's process), and the extracted alkaloid, after evaporation of the amyl alcohol, was estimated, in acid solution, by Mayer's solution. The details and results are given (from Mr. Stecher's work) in the writer's report on Morphiometric Processes for Opium.

† Read at the Fourth Session.

quinia, 10 per cent. quinidia, and 10 per cent. cinchonidia with 70 per cent. *cinchonia*, I have failed to dissolve out more than 6 or 7 per cent. of the mixture, whereas theory would call for at least 30 per cent. The alkaloids were those prepared by Powers & Weightman, and answered all the tests of pure substances when tried separately.

This experiment was tried several times with about the same results, though the process was varied by dissolving the alkaloids and reprecipitating them so as to have them in the most soluble state possible.

The sulphocyanides I have found most unsatisfactory when experimenting upon mixtures, though when pure salts were used they were tolerably characteristic, though from my observations I am inclined to think the forms of the crystals are considerably varied by the conditions under which they are formed. The concentration and temperature of the solutions modify very strongly the size and character of the crystals.

As the result of my examinations I would advance one caution to those who are examining and giving the formulas of various compounds purporting to contain these various alkaloids, which is simply this: after having made a full analysis of the alkaloids, and having ascertained the probable formula, then construct a compound similar to the one examined and make an analysis of it, and see if the results agree with your former ones. Until this check analysis is made very little dependence can be placed upon any results which are obtained.

I have known reports to be made on these mixtures which, without doubt, were perfectly honest, and yet which differed from the truth at least five or ten per cent., and this has arisen, no doubt, from the difficulty of dissolving the three other alkaloids in ether in presence of a very large excess of cinchonia.

114 State Street, Boston, August, 1878.

TRIAL OF VARIOUS SCHEMES FOR THE SEPARATION AND QUANTITATIVE ESTIMATION OF QUINIA, QUINIDIA, CINCHONIA, AND CINCHONIDIA.*

BY ALBERT B. PRESCOTT AND HUGO THUM.

The schemes were based on the solubilities of the alkaloids in different menstrua, as described in the processes below. First, however, it was necessary to prepare chemically pure salts.

I. Preparation of Chemically Pure Salts.

1. Powers & Weightman's quinia sulphate gave a slight indication of the presence of cinchonidia (Kerner's test). The salt was shaken repeatedly during half an hour with 20 parts of Squibb's chloroform, then turned on a filter and washed with 40 parts. Any quinidia or cinchonia would be removed by the chloroform (vide solubilities, below). The salt on the filter was washed with 30 parts alcohol, which dissolved about one-fourth of the entire quantity. Since cinchonidia sulphate is readily soluble in alcohol (Leers and Hesse), whereas quinia sulphate is soluble only in 100–115 parts (Fehling's Handbuch d. Ch., II, 547), this solvent removes any cinchonidia that may be present. The residue, after testing for other cinchona alkaloids by Godefroy and Ledermann's test, was dried at 55° C.

2. A quantity of Powers & Weightman's quinidia sulphate was dissolved in dilute sulphuric acid, the solution carefully neutralized, some solution of rochelle salt ($KNaC_4H_4O_6$) added, and the mixture allowed to stand twenty-four hours. A few small crystals were found—tartrates of quinia or cinchonidia, or both. These crystals were separated by decantation and the liquid treated while warm with potassium iodide solution. The quinidia was precipitated as hydriodate, leaving any cinchonia in solution. The quinidia was obtained from the hydriodate by decomposing with ammonia, washing the residual alkaloid with water, dissolving with a small quantity of dilute sulphuric acid, so that the solution was neutral or very slightly alkaline to litmus, and then setting aside to crystallize.

3. Pulverized commercial cinchonia manufactured by Powers

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* Read at the Fifth Session.

& Weightman was washed with cold alcohol until about one-third of the salt had dissolved. Cinchonia is soluble in 110 parts, quinia in 3 parts, quinidia in 20 parts 90 per cent. alcohol (Hager's Handbuch d. Ph. Praxis, II, pp. 888, 839, 837), and cinchonidia in 19.7 parts 80 per cent. alcohol (Fehling's Handbuch d. Ch., II, 705). This washed residue was changed into the neutral sulphate in the same manner as the quinidia. The dried crystals gave no color upon addition of chlorine water and ammonia, nor any crystals characteristic of the other alkaloids.

4. Powers & Weightman's cinchonidia sulphate was agitated with 20 parts chloroform and washed with 30 more. Quinidia and cinchonia were thus removed. The residue was dissolved in sufficient quantity of warm water, sodic hydrate added, and the resulting precipitate washed with water, dried at 55° C., and treated with 30–35 parts ether. Quinia is soluble in about 25 parts (Hager's Handbuch d. Ph. Praxis, II, 839), or 21 parts (Am. Jour. Ph., Oct. 1877, p. 484). The cinchonidia, after drying at 55° C., was changed to neutral sulphate and found to be pure.

II. THE PROCESSES AND RESULTS.

1. The first process was based on the different solubilities of the sulphates of the alkaloids in chloroform, the solubilities of quinia and cinchonidia sulphates in water, and the precipitation of quinidia as hydriodate.

"The neutral medicinal sulphate of quinia is insoluble in chloroform" (Hager's Handbuch d. Ph. Praxis, II, 848).

"Quinia sulphate is soluble in 1000 parts chloroform at 15° C." (Hesse, Jahresberichte, etc., 1873, p. 341).

"Quinidia sulphate is soluble in 19.5 parts chloroform at 15° C." (Ibidem).

"Cinchonia sulphate is soluble in 60 parts chloroform at 15° C." (Ibid.).

"Cinchonidia sulphate is soluble in 1000 parts chloroform at 15° C." (Ibid.).

"Saturated water solution at 15° C. of neutral quinia sulphate contains $\frac{1}{755}$ of this salt" (Kerner, in Husemann's Pflanzenstoffe, p. 292).

"Sulphate of quinia is soluble in 740 parts water" (Von Heigninger, Baup, Herapath, in Storer's Dictionary of Solubilities).

"Cinchonidia sulphate is soluble in 97 parts cold water, according to Bussy and Guibourt; 73 parts, according to Howard; 95 to 100 parts, according to Kerner" (Gmelin's Handbook, XVII, 224).

"A saturated water solution at 15° C. contains from $\frac{1}{110}$ to $\frac{1}{98}$ of cinchonidia sulphate" (Kerner, in Husemann's Pflanzenstoffe).

"Quinidia hydriodate is soluble in 1250 parts water at 15° C." (De Vrij, in Gmelin, XXII, 299).

"100 parts of quinia sulphate dried at 212° F. until weight is constant, represents 75 parts pure quinia" (Grundriss d. Ph. Chem., F. Elsner).

In considering the above solubilities it seemed that the quinia and cinchonidia might be separated from the other alkaloids by chloroform, and from each other by treating with water, and that cinchonia and quinidia might be separated by means of potassium or sodium iodide.

The first question that presented itself was, "How much chloroform shall be used?" Should the salt taken be pure cinchonia sulphate, it is evident more chloroform would be required than if it were quinidia sulphate. It is also evident, that in the case of good bark less chloroform is required than when poor bark is used, since a larger proportion of the alkaloids is quinia. Since it is desirable to use as little of the solvent as possible, it was concluded that in the case of good barks 40 parts of chloroform be taken to 1 part of the sulphates, and in the case of poor barks 60 parts would be required. Then it was decided to use enough water in the separation of quinia and cinchonidia sulphate to dissolve the salt if it were all cinchonidia sulphate, and to allow for the amount of quinia sulphate dissolved in the water, *i. e.*, one part for every 740 parts of water.

The following scheme was thus suggested.

Treat the neutral sulphates with 40–60 parts of absolute chloroform, and shake at intervals for 4 hours.

Solution A.[1]

(Containing quinidia and cinchonia sulphate, and a trace of quinia and cinchonidia.)

Allow to evaporate spontaneously, redissolve with water, add a solution of sodium iodide, stir, allow to stand several hours.

Filtrate.	*Precipitate.*
Is evaporated to dryness, at 180° C., after adding sodium carbonate in excess, the residue treated with alcohol. The filtrate is evaporated to dryness at 55°, and from the weight is subtracted the weight of quinia, dissolved by the chloroform, which is .000728 for every gram of chloroform, and the amount of cinchonidia, or .00075 for every gram of chloroform. The remainder is the amount of cinchonia present.	Is washed with a little water and dried on the water-bath. One part represents 0.718 part anhydrous quinidia. (Attfield, 7th ed., p. 590.)

Residue A.[1]

(Consisting of quinia sulphate and cinchonidia sulphate.)

Remove from the filter while moist and ascertain the weight of the precipitate adhering to the filter. Treat the residue in the beaker with 100 parts cold water, shaking often during a period of 4–6 hours.

Solution.	*Residue.*
Add sodium carbonate in slight excess, evaporate to dryness at 180° F. Treat the residue with alcohol, filter, evaporate the filtrate to dryness at 55° C., subtract the amount of quinia present, and add the proportion adhering to the filter-paper, and the result is the total amount of cinchonidia.	Dry on filter, at 100° C., until weight is constant; 100 parts represent 75 parts pure quinia; .000728 gram are added for every gram of chloroform used, and the same amount for every 740 cc. of water used. The proportion of quinia adhering to the filter is added and the sum is the total unit of quinia.

Experiment A.

.40575 gram quinia sulphate and .35125 gram cinchonidia sulphate (dried at 55° C.) were taken; 24.13 grams Squibb's chloroform were added and the mixture allowed to stand 22 hours. It was then poured upon a tared filter and the residue washed with 9 grams of chloroform. (The chloroform ran through clear and fast, notwithstanding the jelly-like consistency of the mixture.) Residue A[1] and filtrate A[1] were thus obtained.

Residue A[1], after removal from the filter, was warmed in a beaker until the salt had dissolved, then cooled to 15° C. and the solution became turbid. 25 cc. of water were added, so as to insure the solution of all of the cinchonidia. The precipitate was filtered out and washed with enough water to make 100 cc. of filtrate (A^2).

The residue (a^2) was dried and found to weigh .26509 gram, which represents of pure quinia, base,	.198822
Adding to this the weight of quinia, dissolved in the shape of quinia sulphate, by the chloroform,	.02582
The amount dissolved in 65 cc. at water solution,*	.06394

Now the amount of quinia sulphate taken was .40575 gram, which represents .29542 gram anhydrous quinia. Therefore, 99.11 per cent. of the quinia were recovered. The filtrate (A^2), containing the cinchonidia sulphate and the small amount of quinia sulphate, dissolved in the water, it was thought might be evaporated to dryness and weighed as sulphate; but this was found to be impossible, on account of the hygroscopic nature of the salt.

Experiment B.

Quinia sulphate taken,	.400 gram.
Cinchonidia sulphate taken,	.321 gram.

The quinia was estimated precisely as in experiment A, and with the following results:

Weight of the quinia sulphate dried at 100° C., .2643 representing pure quinia,	.1982
The amount of quinia dissolved in chloroform,	.0255
Amount removed by 65 cc. saturated water solution,	.0629
Proportion of quinia on the filter,	.0026
Total amount of quinia,	.2892

Or 98.27 per cent. of the quinia were recovered.

The filtrate (B^2), from which the quinia had been separated, was treated with an excess of sodium carbonate, etc., as directed in the process.

The weight of the total amount of cinchonidia and quinia, dissolved in the water was,	.2755
Subtracting the weight of the quinia dissolved in the water, adding the weight of cinchonidia dissolved by the chloroform (.0255) and the amount that adhered to the filter (.0020), the total amount of cinchonidia obtained was,	.2391

Or 99.27 per cent. were recovered.

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* The amount dissolved in washing is disregarded as being entirely uncertain.

And the proportion of quinia which adhered to the filter,	.005538
Gives the total amount of quinia,	.293810

Experiment C.

A mixture of the four alkaloid sulphates was taken:

Quinia sulphate,	.4405 gram.
Cinchonidia sulphate,	.2492 "
Quinidia sulphate,	.1692 "
Cinchonia sulphate,	.0905 "

After allowing to stand 22 hours with 20 cc. Squibb's chloroform, the mixture was turned on to a tared filter and the residue washed with 15 cc. of chloroform. Residue (Y^1) and filter (Y^2.) Residue (Y^1) was allowed to dry as far as possible, by spontaneous evaporation, then dried completely at 55° C. It weighed .5157 gram, whereas the amount of quinia and cinchonidia sulphate taken was .6897 gram; so that by the action of the chloroform .174 gram had dissolved. From this it was concluded that the presence of quinidia or cinchonia sulphate or both increases the solubility of quinia or cinchonidia sulphate or both in chloroform, since in experiments A and B a much smaller proportion of these salts was dissolved.

Experiment D.

An attempt was made to confirm the above conclusion by weighing the amount of quinidia and cinchonia sulphates, dissolved by chloroform, in the presence of the other salts. This experiment was a failure on account of the amorphous condition of the residue after evaporating the chloroform.

Experiment E.

The four salts were taken:

Quinia sulphate,	.0745 gram.
Cinchonidia sulphate,	.0915 "
Quinidia sulphate,	.0892 "
Cinchonia sulphate,	.0505 "

Five cc. of chloroform were added, the mixture allowed to stand 4 hours, filtered, the residue on the filter, consisting of quinia and cinchonidia sulphate, dried at 55° C., and found to weigh,	.1255 gram.
The weight of the salts taken was,	.166 "
Then the amount dissolved in 5 cc., or 7.625 gram chloroform was,	.0405 "

In experiment C, 51.75 grams chloroform dissolved .174 gram of these salts, or 1 gram dissolved .0033 gram, and in experiment E 7.625 grams chloroform dissolved .0405 gram, or 1 gram dissolved .0052 gram.

The comparison of these results showed not only that the solubility of the quinia and cinchonidia sulphate in chloroform is increased by the presence of the other sulphates, but that it is increased differently by different amounts.

Therefore, no accurate separation of the four alkaloids can be made by this process. However, quinia and cinchonidia may be separated by the use of water at 15° C.

(2.) The second process was based on the difficult solubility of quinia sulphate in water, as compared with the solubilility of the other sulphates.

Quinia sulphate is soluble in 740 parts water. (Vide above.)

Cinchonidia sulphate is soluble in 73–110 parts cold water. (Vide above.)

Cinchonia sulphate is soluble in 60 parts water at ordinary temperature. (Hager: Handbuch d. Ph., Praxis II, 888.)

Quinidia sulphate is soluble in 100 parts water. (Hager: Unterschungen, II, 219.)

It seemed that if the four sulphates were treated with hot water, then cooled to 15° C., most of the quinia sulphate would crystallize out, leaving a saturated solution of quinia sulphate holding in solution also the other sulphates. The following experiments were made:

Experiment F.

To ascertain the amount of quinia sulphate remaining in 1 cc. of water after the hot solution had been cooled to 15° C.

Two portions of quinia sulphate .150 gram each were treated with 75 parts of water, heated five minutes at 82° C., cooled to 15°, filtered, and the filters water washed till, in each case, 6 cc. of filtrate had passed through. The filtrates were evaporated and residues found to weigh .0112 gram and .0110 gram. From this it appears that more quinia sulphate was dissolved than is given by the different authorities. But though it is greater, it seems to be definite. It now remained to determine whether the presence of the other sulphates would affect the solubility of that salt. The following experiments were made to determine this.

Experiment G.

.190 gram of sulphates was treated with 40 parts of water. The residue on the filter weighed .0687 gram. As the amount of quinia in the mixture was .050 gram, it was evident that not enough water had been used.

Experiment H.

Same as experiment G, except that 60 parts of water were used instead of 40.

Quinia sulphate,	.050
Cinchonidia "	.035
Quinidia "	.0457
Cinchonia "	.049
	.1797

Weight of the recrystallized sulphate, .038.

Amount of quin. sulph. dissolved by 11 cc. water was .0117.

1 cc. water dissolved .0010 quinia sulph.

Experiment I.

This experiment and the following ones, J, K, L, and M, are similar in all respects, except that the proportion of water used is different.

In this experiment 70 parts were taken.

Quinia sulphate,	.1235	gram.
Cinchonidia "	.0797	"
Quinidia "	.0014	"
Cinchonia "	.0379	"
	.3425	

Weight of recryst. quin. sulph., 105.

Amount dissolved by 24 cc. water, .0185.

1 cc. water dissolved .00075 grams quin. sulph.

Experiment J.

Similar to Experiment I.

Quin. sulphate,	.1287	gram.
Cinchonidia "	.0830	"
Quinidia "	.0710	"
Cinchonia "	.1760	"

Weight of recryst. quin. sulph., .096 gram.

Amount dissolved by 34 cc. water, .1327 gram.

1 cc. water dissolved .00096 gram. quin. sulp.

Experiment K.

Similar to I and J.

Quin. sulphate,	.130	gram.
Cinchonidia "	.200	"
Quinidia "	.110	"
Cinchonia "	.040	"
	.440	

Weight of recryst. quin. sulph., .109 gram.
Amount dissolved by 34 cc. water, .021 gram.
1 cc. water dissolved .00068 gram quin. sulph.

Experiment L.

100 parts of water were used.

Quin. sulphate,	.100 gram.
Cinchonidia "	.100 "
Quinidia "	.100 "
Cinchonia "	.050 "
	.350

Weight of recryst. quin. sulph., .0747 gram.
Amount dissolved by 35 cc. water, .0252 gram.
1 cc. water dissolved .00072 gram quin. sulph.

Experiment M.

Quin. sulphate,	.310 gram.
Cinchonidia "	.281 "
Quinidia "	.4315 "
Cinchonia "	.350 "
	1.3725

Weight of recryst. quin. sulph., .232 gram.
Amount dissolved 103 cc. water, .078 gram.
1 cc. water dissolved .00075 gram quin. sulph.

The greatest amount of quinia sulphate retained in 1 cc. of water at 15° C. was .0010 gram (Exp. H); the smallest amount was .00068 gram (Exp. K); the average amount was .00048 gram. This quantity, or one based on a larger number of experiments, would have to be multiplied by the number of cc. of water used, and the product added to the weight of recryst. quin. sulph. in order to get the total quantity.

Using this mean .00085 the following results are obtained:

	Quin. sulph. employed.	Quin. sulph. found.
Exp. H,	28.5 per cent.	27.2 per cent.
I,	36.05 "	36.6 "
J,	28.65 "	27.27 "
K,	29.77 "	31.36 "
L,	28.6 "	29.8 "
M,	22.57 "	23.31 "

Apparently then quin. sulph., in a mixture of the four alkaloids, can be estimated to within 1 or 1½ per cent. by the above method. The other three alkaloids may be estimated according to De Vrij's process, or some modification of it.

(3.) A third process was based on the difference in solubility of the four sulphates in ammonia of the sp. gr. .92 at 15° C.

According to Kerner (Husemann's Pflanzenstoffe):

1 cc. ammonia	(sp. gr. .92)	dissolves	.0013	gram	quinia	sulphate.
1 cc.	"	"	.0004–.0009	"	quinidia	"
1 cc.	"	"	.00062	"	cinchonidia	"
1 cc.	"	"	less than .00006	"	cinchonia	"

Experiments N and O were made to ascertain whether cinchonia sulphate could not be separated from the other sulphates by the use of ammonia of the above strength. Ammonia enough to dissolve all the quinia sulphate, were it $\frac{75}{100}$ of the mixture, would have to be taken.

Experiment N.

Cinchonia sulphate,	.1045 gram.
Quinidia,	.120 "
Cinchonidia,	.144 "
Quinia,	.134 "
	.5025 gram.

To this mixture were added 567 parts or 285 cc. of ammonia (sp. gr. .92), and allowed to digest for twenty-four hours at 15° C. The undissolved portion was filtered out, dried, and found to be .338 gram, or over three times as much as the cinchonia employed.

Experiment O.

Repetition of Experiment N, and gave like results.

Evidently ammonia cannot be advantageously used to separate cinchonia from the other alkaloids.

(4.) A fourth method, essentially P. Carles's process for the separation of quinia sulphate from cinchona bark, was tried.

From .400–.800 gram of the alkaloids or their sulphates are dissolved in 10–12 grams 10 per cent. sulphuric acid, the solution heated to boiling, allowed to cool, and ammonia added until nearly neutral. According to Carles (Fresenius's Zeitschrift, IX, 1873, 497), the quinia would be precipitated and the other alkaloids remain in solution.

In Experiment P, 62 per cent. of the quinia sulphate was recovered.
" Q, 66 " " " "
" R, 60 " " " "

(5.) Riegel says sodium bicarbonate does not precipitate quinia from a solution in 300 parts water, in the presence of tartaric acid (Husemann's Pflanzenstoffe, p. 300, and Heppe's Chemische Reactionen, p. 94).

"In presence of tartaric acid cinchonia is precipitated by sodium bicarbonate only upon boiling" (Hesse, in Husemann, p. 336, and Heppe, p. 113).

A few experiments were made based upon the above assertions. The weights and measures were only approximate.

.100, .050, .030, and .020 gram quinia sulphate were dissolved, each in 5 cc. of water, with the aid of tartaric acid, and gave abundant precipitates with sodium bicarbonate. The highest dilution represented 250 parts of water. In a trial with .010 gram dissolved in 5 cc. or 500 parts of water in the presence of tartaric acid, sodium bicarbonate gave no precipitate.

.050, .150, and .500 gram of cinchonia sulphate treated in precisely the same manner, gave no precipitate.

.020, .200, .500, and .700 gram of quinidia sulphate gave no precipitate.

Cinchonidia sulphate reacted in exactly the same way as quinia sulphate, *i. e.*, in 250 parts water, and under, it was precipitated, in 500 parts it was not.

It would seem that the above reactions might be made the basis of *requirements* or *assay methods* for cinchonidia and quinidia. The separation of quinia sulphate by water—process (2) of this work—seems to be worthy of recommendation as a means for the assay of quinia sulphate, and for the determination of the quinia in the total alkaloids of the bark. It is a simple and ready method, and when executed with care, especially as to the neutral reaction required, it is believed that it will give as close a separation of quinia from the other alkaloids as has been obtained. With the application of ammonia to the filtrate it constitutes Kerner's test, the admirable requirement of the German Pharmacopœia for quinia sulphate.

UNIVERSITY OF MICHIGAN, SCHOOL OF PHARMACY, November 4th, 1878.

MINUTES

OF THE

TWENTY-SIXTH ANNUAL MEETING.

First Session.—Tuesday Afternoon, November 26th.

The twenty-sixth annual meeting of the American Pharmaceutical Association convened in Concordia Hall, in the city of Atlanta, on the afternoon of Tuesday, November 26th, 1878, President, William Saunders, in the chair; John M. Maisch, Secretary.

At 3.30 P.M. the President announced that more than a quorum was present, and after calling the meeting to order, introduced his Honor Mayor Angier, who addressed the Association as follows:

MR. PRESIDENT, GENTLEMEN OF THE PHARMACEUTICAL ASSOCIATION:

As an official representative of this city I have the honor of extending to you a cordial greeting. We are proud and gratified that you have designated Atlanta as the place of your twenty-sixth annual convention. After having an international association, this being a branch of the same, assembled in grand old Venice, "the queen of the Adriatic," opulent in the memories and the conspicuous part she has held in the world's history, and in the city of "Brotherly Love," where the spark of American liberty was first kindled, and then spread in a broad, luminous blaze throughout the length and breadth of this vast continent, a powerful beacon-light upon the shores of time, and in Toronto, laved by the waters of the sweeping, majestic St. Lawrence—now you have come to the queenly fair daughter of the forest, though young, but little less rich in the memories that cluster thick around her, and in her contributions to history, and in the march of events that made her famous, at least in suffering and fortitude. If we but cast our eyes back a score and a half years, we shall find that these valleys and slopes, now dotted with comfortable homes, with many pleasing outlooks, and these hills on which so many mansions now rise, and these streets with massive blocks on either side, and these thoroughfares now thronged with business and beauty, were the hunting-grounds of the pioneers of civilization. A little further back the red man roamed at will these then vast forests; here the war-whoop and battle-cry were raised, and many are the fields of battle that witnessed their wild and fierce encounters. "But as yesterday the wild bird built her nest and reared her brood of little ones where now the proudest monuments confine the hum and hurry of a multitude." Yet, in the recent conflict, war's desolating besom of destruction swept over her, and there remained but a mouldering heap of ruins of the beautiful prize for which Hood and Sherman contended. But gathering strength from her fall and contact with mother earth, the child of the woods bounded again into renewed, vigorous life, the pride and joy of the grand old Empire State of the South. And now, resting and nestling upon her native hills, with natural surroundings insuring vigorous health the entire year, she is prepared and preparing for still greater struggles and conquests. And if you would like to know the secret of her success, it is her people—the indomitable will and indefatigable industry, energy, and enterprise of her people—these are her pharmacists.

And as if a recompense and encouragement for her assiduous toils and final triumph, this young maid has recently been honored in various ways by distinguished visitors. Scarce a year has passed since the President of the United States, with a portion of his cabinet, paid their respects as pacificators to pour oil upon the troubled waters. Then the International Sunday-school Convention, with representatives from ocean to ocean—from the Lakes to the Gulf—from her Majesty's dominion on the north, and from beyond the mighty waters—lofty in its grand mission of obeying Him whose message was "peace on earth and good-will to men." Then the Medical Association of our own State, noble in its purpose, but helpless and powerless without your aid. Then the General Conference of the Methodist Episcopal Church South, which brought from far and near, even the remotest parts of our Republic, followers of "the lowly Nazarene." And here upon this good day, in the capital of our disenthralled, much-saved State, assembled a learned, intelligent body of gentlemen, with as noble an object as ever inspired the human breast.

When man in his primitive innocence first disobeyed the plain and positive command of his Maker, the latter and legitimate fruits were sin, disease, and death; but notwithstanding the great disobedience, the means have been placed in man's power of overcoming the one, destroying the other, and finally of rising triumphantly over the last great enemy. And he who contributes "even a mite" to the deliverance of human suffering, thus prolonging life, and rendering still greater the destinies and possibilities of our race, is infinitely more a benefactor, and deserves more the enduring brass and marble, than he who "wades through a sea of slaughter to a throne," and builds his name and fame upon the blood and agony of the wounded, dying, and dead, and the tears and anguish of widows and orphans.

Your Association is lofty in its aim, noble in its purpose, and grand in its results. It knows no North, no South, no East, no West—no clime no country. Its broad field is the universe, its clime the world, as the theatre of its action and conquest. Wherever the human frame is racked with suffering or wasted with disease, there you stand, like the good Samaritan, ever ready, willing, and able to relieve. May your usefulness continue and increase, and your discoveries be enlarged, so that wherever, whenever, and however, disease and pain may attack mankind, you may go forth conquering and to conquer, and be crowned with new and fresh laurels won in the conflict with disease and distress.

The address was warmly received, and in response thereto President Saunders said:

SIR: In behalf of the Association over which I have the honor to preside, let me return to you the most sincere thanks. Coming as I do from the land of frost and snow, I know how to appreciate your genial climate and your warm words of welcome. But we belong as a rule to the laboring class, and are more given to working than talking; so I will not inflict upon you a lengthy address. Again I thank you for your cordial greeting. [Applause.]

The chair appointed the following Committee on Credentials: G. J. Luhn, of South Carolina, F. T. Whiting, of Massachusetts, and G. S. Russell, of New Hampshire. The credentials were handed in and the committee retired, when the President read his annual address, as follows:

PRESIDENT'S ADDRESS.

GENTLEMEN OF THE AMERICAN PHARMACEUTICAL ASSOCIATION:

In consequence of the general alarm which prevailed in the whole of the United States and Canada on account of the rapid spread of yellow fever in some of the towns and cities along the Mississippi, during the months of July and August, it was feared that a successful meeting of our Association could not be held here at the time originally fixed, namely, the first week in September; and, hence, it was deemed desirable to postpone it until now. That dire scourge having disappeared even in the worst affected districts, the impediments to travel have been removed, commerce is assuming her wonted busy aspect, and we meet once more together under happy auspices. Our annual gatherings are always seasons of enjoyment, but it seems to me that on this occasion there is promise of more than the usual quota of pleasure in store for us. To many of us, especially to those who live so far north as I do, this southern country is a new world. We found a pleasing novelty in watching the changing aspects of nature in our journey southward, as many trees and shrubs long familiar gave place to forms new and strange, and had we been privileged to visit here earlier, in the season before nature had lost her summer charms, our pleasure would have been greatly enhanced in beholding the beautiful plants and flowers which adorn the fields and woods, the feathered songsters which fill the groves with melody, and the brilliant insects which flutter in the sunshine.

Our pleasures on such occasions as these are of a mixed character. We are happy in our work. Loyalty to the interest of the Association, coupled with a strong desire to have it fulfil its proper mission in the advancement of the best interests of the pharmacist, the promotion of right and the suppression of wrong-doing in all the departments in which we are engaged, this, gentlemen, is a motive which has been the magnet drawing many so far south, and most of us would be happy anywhere with almost any sort of surroundings in realizing the accomplishment of these higher purposes. Pharmacists can afford to be upright, truthful, and honest in their business, to maintain their integrity notwithstanding the temptations by which they are beset, and if I know anything of the aims of this Association they are to make us all better men as well as better pharmacists. The more strictly scientific aspects of our meeting also delight many hearts. The prospect of acquiring new ideas, and new light upon old methods of thought and old processes around which perhaps have clustered difficulties which we hope to have removed. Besides which there is the social element, which we can all appreciate. The presence of our friends makes us happy. There is such a charm in the smile of old familiar faces, and the hearty shake of hands and the warmer greetings swelling from the hearts of those whom a year or years have separated give a thrill of pleasure; and as long as the members of this Association continue to be so thoroughly happy in each other's society and so emulous of promoting each other's welfare, these social features in our annual gatherings will always secure an attendance. True, we miss familiar faces as one after another of our members is called away from among us; but we are buoyed with the hope of meeting them again in that "beautiful land beyond the river."

The itinerant character of these gatherings offers many advantages to our members. The year before last we were charmed with our entertainment in Philadelphia, when that great Centennial Exhibition lent an interest to our meetings such as we never had before. Last year you were the recipients of the hospitality of your Northern friends in the Dominion of her Majesty in Canada, now we move more than than twelve hundred miles south to meet our Southern and other friends in Georgia. Thus the pharmacist, closely pent up as he usually is behind his counter or in his office during the greater part of the year, has some good opportunities given him of acquainting himself with the extent and resources of his country, the products of the soil, its geological strata, the character of its fauna and flora; and last, but not least, of making friends everywhere.

But I must leave these pleasing generalities, and try and present you with something a little more substantial. It is expected, I believe, of your retiring President, that he should in the annual address which closes his official labors endeavor to elucidate or bring together some of the scientific facts bearing on or related to pharmacy, and I have thought that it might perhaps be profitable for us to look for awhile at the state of pharmacy at the time of the discovery of America, and to note in some detail how the art of medicine has been indebted to the New World for many of its most valued officinal articles.

When, on the 14th day of August, A.D. 1492, Columbus set sail on his ever-memorable voyage, he left behind him a very different Europe from that of the present day. The manners of the people were little less than barbarous, and history at this time chiefly records a series of treasons, usurpations, murders, and massacres. Even the kings and courts had very narrow and selfish views, seldom looking beyond present advantages. The elegance and purity of the Latin tongue was then the highest and almost the only point of a scholar's ambition. Mathematical learning was little valued or cultivated. The true system of the heavens was not dreamt of; there was no knowledge at all of the real form of the earth, and in general the ideas of mankind did not extend beyond their sensible horizon. Just about this time there was an extraordinary coincidence of events. Closely associated with the discovery of America was the invention of printing, the improvement of navigation, the revival of ancient learning, the reformation, and the discovery of the proper method of preparing gunpowder so as to make it effective in warfare; events which conspired to entirely change the face of Europe. Up to this time and for a long period antecedent the science of medicine had made but little progress; indeed, scarcely any advancement seemed to have been made from the time of Hippocrates, Galen, and Celsus, and the same remark will also apply with equal force to a long period subsequent. The works of Celsus in many respects read more modern than do those of the learned Dr. Riverius, physician to the King of France, who obtained great reputation for his medical skill and writings in the early part of the seventeenth century. Among the different classes of medicines referred to by these authors take as an illustration anodynes. We find in Celsus prominence given to opium, concentrated decoction of poppies, castor, myrrh, pepper, henbane, and hemlock seeds. In Riverius we have opium also, but associated with such things as decoction of borage, fumitory, and chiccory, and much stress laid on accompanying external applications, such as marsh-mallow root, cow's milk, the excrement of cows and sheep, the yolk of an egg, a live puppy, etc. There were some curious methods of compounding in those days. One of the chapters in Dr. Riverius's "Universal Body of Physic" is headed thus: "Of the Decoction of an old Cock," wherein it defines that there are two forms of this decoction in use; one he calls an altering decoction, which he says "is used not seldome in chronical diseases, as hypochondriacal melancholy, asthmas, etc.;" the other a purging decoction. The formula prescribes that the old fowl after being wearied with blows and running before he is killed, is to be dressed and stuffed with a mixture of bruised roots and seeds, and then boiled until the flesh be separated from the bones, when the liquid after being strained is ready for use. Fancy one of our more plethoric pharmacists of the present day with this prescription in hand having carefully selected a venerable male representative of the Gallus bankivus, proceeds to vigorously pursue the unfortunate creature around a small city backyard on a hot summer's day, with stick in hand dealing careful blows so as to insure that amount of weariness in the victim so necessary to the virtues of the compound, and then after the proper stuffing watching the long process of ebullition until the leathery structure become tender. One experience of this sort would, we think, reconcile him to the most composite of compounds of the present day.

The list of vegetable medicines at that time was large. In 1710 appeared Salmon's "English Herbal," a ponderous quarto of over 1300 pages, profusely illustrated, in which there are described 752 herbs of English growth, including almost every variety of wild and cultivated plant and shrub then growing in Britain, and to most of them are ascribed virtues of an astonishing character. As a specimen, take the common garden sage. This is said to be "hot and dry in the third degree, astringent, anodyne, carminative, digestive, discussive, diuretick and traumatick, cephalick, neurotick, stomachick, hysterick, arthritick, emmenagogick, sudorifick, alexipharmick, and analeptick." It is said to be "good against a vertigo, lethargy, headache from a cold cause, palsie, convulsions, spitting blood, weakness of the nerves, poison, the bitings of serpents and other venemous creatures, the plague and other malarial and pestilential diseases, catarrhs, rheumatisms, etc." Some idea may be formed as to what is embraced in the et cetera by reading the succeeding pages, where details of the various preparations of this herb are given, and their wonderful properties dwelt on. The preparations are, 1st, the green leaves; 2d, the juice; 3d, the essence; 4th, an infusion in wine or water; 5th, a powder of the leaves; 6th, an oil or ointment; 7th, a cataplasm; 8th, pills; 9th, a gargarism; 10th, a distilled water; 11th, a spirituous tincture; 12th, an acid tincture; 13th, an oily tincture; 14th, a spirit; 15th, a distilled oil; 16th, the potestates or powers; 17th, an elixir; and 18th, a conserve of the flowers.

The animal remedies of the same period might be reckoned by the hundred, for even as late as 1730 the second edition of the "Edinburgh Pharmacopœia" contained no less than 84 of them. This second edition claimed to be a great improvement on the first, for in the preface we are told that it differs from the former edition in that "some things are left out as not differing from others in virtue, or as having been introduced by the superstition or credulity of antiquity." In this edition there are included four hundred and seventy-five vegetable remedies, only ninety of which are now officinal, and out of the total number there were but fourteen remedies of American growth. The animal substances in the same work numbered eighty-four, only thirteen of which are now retained, and of these two are used almost exclusively as perfumes. The mineral preparations numbered fifty-seven. Many tinctures were added in this edition, a class of remedies just then coming into use, and said to be generally acceptable to the patient by the agreeable smallness of their dose. The doses of medicines at that time were very large; a quarter of a pint was a common-sized dose, a wineglassful a rather small one. Of tinctures there were twenty-six in all, also six elixirs and two wines, wine of ipecac and wine of millepedes. The method of preparing the latter was as follows: Take three hundred live millepedes, bruise them a little and pour thereon a pint of Rhenish wine; let them infuse for a night, and afterwards press out the wine. This, the authors remark, "is a commodious way of obtaining the virtues of the millepedes, and thus they may be exhibited to great advantage." Among the preparations there are also seventeen distilled waters, to which list, although not distilled, is added frog-spawn water, which is prepared by hanging any quantity of frog-spawn in a bag and collecting the water which gradually drips from it. There are also eleven compound waters, three spirits, eight infusions, four acetums, twelve decoctions, twenty-eight syrups, five oxymels, four jellies, five succus, twenty-three conserves, three lozenges, sixteen powders, fifteen electuaries, seven lohocks, eighteen pills, thirteen troches, ten oils, four balsams, twenty-five ointments, twenty plasters, twenty-seven distilled oils, and fourteen extracts.

Late in the seventeenth century, Joseph Donatus, a physician of Marseilles, a lover of botany, was sent to America by the French King, "to promote botanick knowledge." He brought home with him the seeds of many scarce and curious plants, some of which were said to possess wonderful virtues. In "Pomet's History of Druggs," published in 1701, a list of these articles is printed, numbering one hundred and twenty-one, nearly all of them designated by Indian names, with a short description appended, but of such a character as would puzzle the highest botanical authorities to divine what was meant by them. The following will serve as examples: "Bamatu, with five leaves, a tree that is crooked, with a pear leaf and a purple bell-flower. Macenilla, a venemous and milky tree, with a sweet fruit like an apple, which the Indians poison arrows with. Mandubi, an American four-leaved plant with a yellow flower. Tobocora, a thorny venemous sea-tree, with a double round leaf and berries turned up with little horns, including in 'em a sort of flat agat-like stones."

We can scarcely appreciate the difficulties which workers in all departments of natural science labored under before the immortal Linnæus introduced the binominal system of nomenclature. Previous to this, a short description, or else some prominent or striking feature in connection with the object referred to, formed a necessary part of the name. For instance, the English lavender, which we now know under the name of Lavandula vera, was then referred to as "a small plant which botanists call spica, sive lavandula mas, vel nardus Italica, aut pseudo nardus, which signifies spike, male lavender, Italian or bastard nard. Another example: Gentiana lutea was then known to science as gentiana vulgaris major, ellebori albi folio, the larger common gentian with the white hellebore leaf. Burdened with such a cumbrous incubus as this, it is no wonder that natural science made so little progress.

At this early period the business of supplying the public with medicines was divided between two classes of dealers, the druggists and the herb-sellers, the former devoting their attention to the drugs from foreign sources and the preparations to be made from these as well as from European herbs; while the latter collected herbs and sold them at wholesale to the druggists for manufacturing purposes, and at retail to the public at large. The character of the general dealers in drugs and chemicals was far below what it is at present. There were no pharmaceutical associations then, with the object of disseminating information, and no desire among pharmacists to enlighten their fellow-laborers. On the contrary, every little discovery in the way of improvement was guarded with the most jealous secrecy, for fear that some competitor might share in the advantages which it conferred; indeed men seemed to have the idea that they had a sort of patent right to the results of every advance they might make in the knowledge of their business, and the mysteries of the trade were handed down from father to son with the most scrupulous care, as things never intended for the light. In 1758 was published a work by an anonymous author, which must have made some stir among the pharmacists of that period, as it exposed the evil practices of many, and made known a number of processes and formulas hitherto kept secret. It was entitled "The Elaboratory Laid Open, or the Secrets of Modern Chemistry and Pharmacy Revealed." From the revelations here made it is evident that at this early period the iniquitous practice of adulteration permeated all departments, and that even among chemical substances there was scarcely one of which there was not a true and fictitious article in the market. The wholesale dealers and manufacturers appear to have been very unscrupulous, and to have imposed upon the retailers who placed confidence in them in every way they could, while the retail pharmacists, instead of making their own preparations after the standard formulas, were content to buy everything their customers needed ready made, and it is stated that "nearly the whole of what is sent into the country differs from the regular and orthodox prescription."

Some important American remedies found their way very slowly into use. When the "Edinburgh Pharmacopœia of 1730" was published cinchona bark had then been known for eighty years, and had been in more general use for twenty-four years, yet there was only one preparation of it, and that a simple watery extract. The following short history of the introduction of cinchona or China Chinæ as it was then called, is given in this work. "This simple is the bark of a certain tree growing in the West Indies and called by the Spaniards Fever Tree, on account of its surprising efficacy in the cure of that distemper." After naming some of the localities from which it was obtained and briefly describing the tree, it states that "Cardinal de Lugo was the first who brought it into France in 1650, upon which it was then called by his name, but afterwards by the name of Jesuit's powder, because they had the distributing thereof: the Cardinal, who was of their order, having left them a large quantity. Its use was now neglected till the year 1706, when Dr. Talbot again brought it upon the stage in France, and established its reputation by the numerous cures he performed with it. These cases appeared so extraordinary to the King of France, the great Louis XIV, that by a royal reward he procured the doctor to publish his secret." Its use, however, during the long interval mentioned, was not entirely discontinued. In "Salmon's Practical Physic," published in 1692, among twenty-three remedies for ague, occurs the following: "A specific against all manner of agues take quin qum or Jesuit bark, two drachms, beat it into a powder just about the time of using it, infuse it in a good draught of claret or other generous wine for the space of two hours, then give the patient both liquor and powder at once." The enormous price at which bark was at first held must have restricted its use to the wealthy. Pomet tells us that when Cardinal Lugo brought it first from Peru it was sold weight for weight for the price of gold, equal to four pounds sterling per ounce. There were some curious remedies in use for intermittents about this time. We extract the following from "Dr. Fuller's Body of Prescripts," published in London in 1710. "Remedy for ague, a cataplasm of herbs. Take Venice turpentine two ounces, juice of plantain one ounce and a half, figs three, the yellow paring of orange rind two drachms, bole one drachm and a half, soot half an ounce, pigeon's dung one ounce and a half, large spiderwebs six, black soap four ounces, vinegar enough to beat it up with. To drive an ague, tie this about the wrists, so as to make it bear hard upon the pulses, two hours before the fit."

The same work recommends a decoction of chamomile flowers with a little cochineal and salt of wormwood, as a specific in intermittents little inferior even to the famed Peruvian bark.

Long after this the bark had many opponents, and the contest waxed warm between these and its advocates for many years. In 1747 John Wesley wrote his book of "Primitive Physic." In a postscript to the preface of his work the following occurs: "It is because they are not safe but extremely dangerous, that I have omitted the four Herculean medicines, opium, the bark, steel, and most of the preparations of quicksilver." Herculean indeed, far too strong for common men to grapple with. How many fatal effects have these produced in the hands of no ordinary physicians! The instances are glaring and undeniable.

About the same time the celebrated Dr. Tissot wrote his work, entitled, "Advice with respect to Health," in which he strongly recommends the use of Peruvian bark, especially in ague. An anonymous reviewer of the period thus criticizes him on this point: "I refer to his vehement recommendation of Peruvian bark as the only infallible remedy either for mortifications or intermitting fevers. He really seems transported with the theme, as do many physicians besides. It is not an infallible remedy either for one or the other. I have known pounds of it given to stop a mortification, yet the mortification spread till it killed the patient. I myself took pounds of it when I was young, for a common tertian ague, and that after vomiting, yet it did not, would not effect a cure, and I should probably have died of it had I not been cured unawares by drinking largely of lemonade. I will be bold to say from my personal knowledge, there are other remedies which more seldom fail. I believe the bark has cured six agues in ten. I know cobweb pills have cured nine in ten. The bark has often stopped a mortification, but sometimes it has failed. I object secondly, that it is far from being a safe remedy. This I affirm in the face of the sun, that it frequently turns an intermitting fever into a consumption. By this means a few years since one of the most amiable young women I have known lost her life, and so did one of the healthiest young men in Yorkshire. I could multiply instances, but I need go no further than my own case. In the last ague which I had, the first ounce of bark was as I expected thrown off by purging, the second being mixed with salt of wormwood stayed in my stomach, and just at the hour the ague should have come began a pain at my shoulderblade. Quickly it shifted its place, began a little under my left breast and there fixed. In less than an hour I had a short cough, soon after a small fever. From that time the cough, the pain, and the fever continued without intermission, and every night soon after I lay down came first a dry cough for forty or fifty minutes, then an impetuous one till something seemed to burst, and for half an hour more I threw up thick fetid pus. Here was expedition. What but a ball could have made quicker dispatch than this infallible medicine? In less than six hours it obstructed, inflamed, and ulcerated my lungs, and by this summary process brought me into the third stage of a true pulmonary consumption. Excuse me, therefore, if, escaped with skin of my teeth, I say to all I have any influence over, whenever you have an intermitting fever, look at me and beware of the bark." Finally, however, the bark conquered these opposing prejudices; about ten years later we find in a work on the commerce of the European settlements in America, when speaking of this substance, the following remarks: "This medicine, as usual, was held in defiance for a good while by the faculty, but after an obstinate defence they have thought proper at last to surrender. Notwithstanding all the mischiefs at first foreseen in its use everybody knows that it is at this day innocently and efficaciously prescribed in a great variety of cases; for which reason it makes a considerable and valuable part of the cargo of the galleons."

Ipecacuanha, a word divided at an early period into two, ipeca and coamna, was another remedy from the New World whose virtues were early recognized, and one which seems to have met at its introduction with comparatively little opposition. It was first brought into use in 1677, in France, by Monsieur Le Gras, a physician who had made three voyages to America; but it does not appear to have attracted general attention until the year 1700, when "Helvetius, an eminent physician of Holland, brought it into repute by the great number of cures he performed therewith." He was the first person who knew the dose and how to manage it to the best advantage. In one of the early medical works it is recommended in cases of dysentery, in the dose of ten grains taken for three successive mornings.

Pareira brava was first brought to France in the year 1706 by the Spanish ambassador on his return from Portugal. It was then esteemed highly as a lithontriptic, a reputation which it still retains.

In 1656 Jalap root, Sarsaparilla, Sassafras, and Guaiacum were in general use, and before the end of that century Serpentaria, Contrayerva, Cochineal, Balsams of Tolu, Peru and Copaibæ were similarly established; but it was long before the true properties of all these were fully discovered, and for many years the most extravagant virtues were ascribed to some of them.

In addition to the articles referred to, America has added the following to our list of Materia Medica: Podophyllum peltatum, Rhus toxicodendron, Stillingia sylvatica, Geranium maculatum, Croton eleuteria, Scutellaria lateriflora, Gelsemium sempervirens, Lobelia inflata, Veratrum viride, Sanguinaria Canadensis, Polygala senega, Phytolacca decandra, Cimicifuga racemosa, Hydrastis Canadensis, Prunus Virginiana, Xanthoxylum fraxineum, and Leptandra Virginica, besides a number of medicinal substances of lesser note. Many of these found their way very slowly into use. In 1801 Dr. Benjamin Smith Barton, of Philadelphia, published the first part of his "Collections for an Essay towards a Materia Medica of the United States." The second part, which completes the volume, was issued in 1804. In this work the author enters at some detail into the progress made up to that time in the knowledge of the uses of the remedies indigenous to the United States, and throughout the attention of the reader is frequently drawn to the fact that the first knowledge we have had of the value of some of the most important of our indigenous remedies has been obtained from the Indians, who long ere the advent of the white man used these remedies to combat the diseases to which their race was subject.

Among the remedies to which he calls especial attention are the following: Geranium maculatum and Heuchera Americana, as astringents. Uva ursi was also recommended as an excellent astringent and as a new remedy in nephritis. Although this plant is common to both the Old and New Worlds, it does not seem to have attracted much attention until about this time. The black snake-root, Cimicifuga racemosa, was then classed with astringents and highly recommended in decoction for putrid sore-throat. It was also said to be used by the Indians in rheumatic cases. Wild cherry bark was just being introduced, and was claimed to be useful in intermittents. The bark and flowers of Cornus Florida was also said to be valuable in this class of diseases, and had then long been held in high esteem among the Indians in such cases. The medicinal properties of Datura stramonium were but little known, but were being investigated with much care. Seneca snake-root is mentioned as a salivative vegetable, of which not much was known. It was classed with purgatives, for which property it was most highly esteemed. It was also thought to be diuretic, and Dr. Smith claimed that he had used a strong decoction of the root with success in croup. The emetic properties of Sanguinaria Canadensis were mentioned, but nothing appears to have been known at this time of the other properties of this valuable root. Asclepias tuberosa, at that time called Decumbens, is spoken of as a mild cathartic. Podophyllum peltatum was also used as a purgative, in doses of twenty grains, and was said to have some advantages over jalap and rhubarb. The extract of butternut bark was favorably noticed as possessed of purgative powers. The author regrets that this extract is often very carelessly made by the country people, and urges that it should be prepared by the better-informed apothecaries, and that this remedy should have a place in the Pharmacopœia of the United States, when such a desideratum shall be supplied. From the same work we learn that at this early period the castor oil plant was cultivated for profit in Maryland, Virginia, and Ohio. Lobelia inflata was just then coming into notice. Although not much was known of its properties, it was supposed to be a diuretic. Spigelia Marilandica was in high favor as an anthelmintic, and was so greatly esteemed by the Cherokee Indians that the author says it would sometimes be dangerous for a person to be detected in digging it up to carry it out of the country. The whites learned the anthelmintic properties of this vegetable from the Indians. Hydrastis Canadensis is spoken of as a popular remedy in some parts of the United States as a tonic, and was also used externally as a wash in inflammation of the eyes. Xanthoxylum fraxineum was mentioned as a medicine well worthy the attention of physicians; and poke-root, Phytolacca decandra, as an active medicinal agent, some of the properties of which had long been known. It was said to be valuable, especially in chronic rheumatism and in some cases of scrofula.

In the first edition of the United States Pharmacopœia, published in 1820, the number of vegetable remedies is about the same as those now officinal, and a large proportion of them hold the same relative standing now as then. A few things at that time in the primary list have since been placed in the secondary, while several articles then in the secondary list are at present in the front rank with those of primary importance. As a notable example of this I would mention ergot.

Our present officinal Materia Medica list includes 256 articles, of which Africa supplies twelve: eleven primary and one secondary; Asia, forty-six: forty-one primary and five secondary; Europe, eighty-six: seventy-five primary and eleven secondary; while America furnishes no less than one hundred and twelve in all, sixty-eight of which are in the primary list and forty-four in the secondary. These vegetable productions are scattered among eighty-one different orders of plants, fourteen of which orders include one hundred and thirty-five remedies, more than one-half of the total number. These fourteen orders, each of which contributes five or more articles to our Materia Medica, if placed in the order of their relative importance with the proportion contributed by each continent, would read as follows: Compositæ, sixteen—America, 4; Europe, 11; Asia, 2; Africa, 1. Leguminosæ, sixteen—America, 6; Europe, 2; Asia, 4; Africa, 4. Rosaceæ, fifteen—America, 5; Europe, 9; Africa, 1. Labiatæ, fourteen—America, 5; Europe, 9. Umbelliferæ, ten—America, 0; Europe, 6; Asia, 3; Africa, 1. Euphorbiaceæ, eight—America, 5; Asia, 3. Ranunculaceæ, eight—America, 6; Europe, 2. Coniferæ, eight—America, 4; Europe, 4. Gentianaceæ, six—America, 3; Europe, 2; Asia, 1. Urticaceæ, six—America, 1; Europe, 4; Asia, 1. Rutaceæ, five—America, 3; Europe, 1; Africa, 1. Liliaceæ, five—Europe, 2; Africa, 3. Gramineæ, five—America, 1; Europe, 4. When we consider the great number of living species of plants now inhabiting the earth, the small proportion of them used as remedies for disease seems quite insignificant. As an illustration of this, take the flora of the Northern United States, including the district east of the Mississippi and north of North Carolina and Tennessee, as given in Gray's "Manual," and see in those orders which contribute the greatest number of medicinal agents what proportion they bear to the whole.

In the order Compositæ we have two hundred and seventy-six native species, and of these only four have as yet found their way into our dispensatory. Of Leguminosæ, which yields six American remedies, we find ninety-five native species, while Rosaceæ has fifty-six, of which five are recognized as remedies. Labiatæ has forty-seven American species, only five of which are officinal, and Umbelliferæ thirty-nine, none of which have as yet found their way into use. Of Ranunculaceæ we have forty-three natives, six of which are included among our remedies, while Euphorbiaceæ gives five to our materia medica list out of a total of thirty-one native species. Of Coniferæ we have eighteen species, four of which are classed among our medicinal agents; Gentianaceæ twenty-three, only three of which are in use. Solonaceæ, of which we have ten American species, supplies us with two remedies; of Urticaceæ we have fourteen natives and only one in use; of Gramineæ, one hundred and thirty-six, only one of which is used; of Liliaceæ we have forty-nine, not one of which is known as a medicine; while in Rutaceæ, of which we only have three native species, all of them are officinal.

We have thus in these fourteen orders in the Northern United States alone, no less than eight hundred and forty species, of which only forty-five are as yet used as remedies, a fraction over five per cent. of the whole; but the number of species we have mentioned gives us only a very partial idea of the richness of the flora of the Continent of America, for south and west of the limits embraced in Gray's "Manual" there is a wealth of vegetation far exceeding that found in the north, and when we add to these products of the northern portion of the Continent the rich and varied flora of South America, our material for experiment far surpasses our knowledge. To avoid misconception, I must mention here that in the forty-five American remedies just referred to, are included all those contributed by the whole Continent of America, so that when looked at from this standpoint, instead of amounting to nearly five per cent. in the orders enumerated, they probably do not exceed one or two out of every hundred species existing. I would not for one moment advocate the idea that every plant not useful for food must necessarily possess some marked medicinal value, yet I cannot help thinking that amongst this great mass of untested vegetable products many valuable remedies will yet be found, the discovery of which may mark eras in the progress of the science of medicine.

Dr. Barton, in his valuable work already referred to, well remarks, that "the man who discovers one valuable new medicine is a more important benefactor to his species than Alexander, Cæsar, or a hundred other conquerors. Even his glory in the estimation of a truly civilized age, will be greater or more lasting than that of these admired ravagers of the world. I will venture to go farther. All the splendid discoveries of Newton are not of so much real utility to the world as the discovery of the Peruvian bark, or of the powers of opium and mercury in the cure of certain diseases. If the distance of time, or the darkness of history did not prevent us from ascertaining who first discovered the properties of the poppy, that sweet oblivious antidote for alleviating pain and for soothing those rooted sorrows which disturb our happiness; if we could tell who first discovered the mighty strength of mercury; or ascertain who was the native of Peru that first experienced and revealed to his countrymen the powers of the bark in curing intermittent fevers, would not the civilized nations of mankind, with one accord, concur in erecting durable monuments of granite and of brass to such benefactors of the species? Would not even the savage, who wants not a sense of benefits conferred upon him, be seen to form the tumulus of stones, or to raise the green sod, the only monuments his humble condition would permit of his erecting? and may we not yet look for the discovery of medicines as important to mankind as opium, the bark, and mercury?"

The progress of such discovery will necessarily be slow; to establish fully the claims of any medicinal agent, long series of experiments are necessary, experiments conducted with great care, and even then so much is sometimes credited to the drug which really results from the remedial efforts of nature, that it is difficult to determine what properly belongs to each. While these experiments do not properly come within the sphere in which the pharmacist labors, yet he is often enabled to greatly aid the physician by his knowledge of simples, and of the most effectual methods of preparing them for use.

Did time permit, I might refer in some detail to the immense climatic advantages America offers for the cultivation of many of the most important foreign medicinal agents, and to the interesting fields for experiment yet unexplored; so varied is the climate and soil in different portions of this Continent that with suitable care in the selection of localities one could scarcely fail in any of these departments. Among the successes commercially in this direction, permit me to mention the culture of the castor oil plant in the West, and the supplying to commerce not only enough of this useful article for home consumption, but also an excess for export trade; to the culture of the orange and lemon in Florida and Southern California, and that of the olive in California, and the appearance of Californian olive oil in our markets; also to the growth in the same favored State of the sweet and bitter almond, and the manufacture of the products obtained from these, for which we have heretofore been indebted to Europe. As an outgrowth of the extensive culture of the finest varieties of grapes on the Pacific slope, and the manufacture on a large scale of excellent wines, we have also the production of considerable quantities of bitartrate of potash and the valued chemical products of which this is the basis. But I must not weary you. Enough has been said to place the New World in the front rank among the continents of the earth for the production of the good and the useful and the beautiful, to satisfy the eye and please the taste, as well as to relieve the distresses of mankind, and enough to show that among the most useful and highly esteemed medicinal agents may be ranked some of the products of this beautiful Western World.

After the close of the address, it was, on motion of the Business Committee, resolved, that it be accepted and referred to a committee of three, to consider and report on any suggestions contained therein.

An invitation was extended by Professor George Little to the members present to visit the rooms of the Geological Survey of Georgia. The invitation was accepted with thanks.

The following resolutions were presented by Mr. Ingalls, and were unanimously agreed to:

Resolved, That his Excellency the Governor of Georgia; the Honorable Mayor of the city of Atlanta, and Aldermen; the Speaker of the House of Representatives, and President of the Senate, the members of both Houses, and the Judges of the Supreme Court, be invited to the courtesies of the floor; also

Resolved, That the President and Faculty of Atlanta Medical College, the Atlanta Academy of Medicine, the Medico-Chirurgical Society, the Staff of the Geological Survey, and the Commissioner of Agriculture be invited to attend our meeting and participate in our proceedings.

The Business Committee announced that the Chairman and all the members of the Committee on Papers and Queries were absent, and on motion, Mr. Walter A. Taylor was invited to act until after the election of a new committee for the ensuing year.

The Secretary read a letter from the Atlanta City Brewery inviting the members to visit their works. The invitation was accepted with thanks.

The following communication was read, accepted with thanks, and ordered to be spread on the minutes:

The Faculty of Atlanta Medical College welcome the American Pharmaceutical Association, and invite the members to visit the College during their stay in the city.

An invitation was received from Dr. Little to visit his rooms at the Capitol, and accepted with thanks. The President stated that he had visited Dr. Little's department, and had found there much to interest the student.

On motion of Mr. Land, of Georgia, a recess was taken for the purpose of examining specimens, until the Committee on Credentials was ready to report.

On reassembling the committee presented the following report:

The Committee on Credentials respectfully report that they have examined the credentials presented, and found the following gentlemen duly accredited as delegates:

Massachusetts College of Pharmacy.—Samuel A. D. Sheppard, Charles A. Supts, Augustus R. Bailey, George F. H. Markoe, Thomas Doliber.

New York College of Pharmacy.—Charles Rice, Paul Balluff, P. Wendover Bedford, Henry J. Menninger, Frederick Hoffmann.

Philadelphia College of Pharmacy.—Alonzo Robbins, James T. Shinn, Charles Bullock, James L. Patterson, Francis M. Murray.

National College of Pharmacy at Washington, D. C.—John S. Jones, Oscar Oldberg, William S. Thompson, T. G. De Mole, G. W. Crossley.

Cincinnati College of Pharmacy.—Jacob D. Wells, Edward S. Wagner, F. L. Eaton, George Eger, R. M. Kinze.

Chicago College of Pharmacy.—James W. Mill, N. Gray Bartlett, F. M. Goodman, Ezekiel H. Sargent, C. F. Hardwig.

Louisville College of Pharmacy.—Emil Scheffer, C. Lewis Diehl, F. C. Miller, Ferdinand J. Pfingst, Vincent Davis.

Alumni Association Massachusetts College of Pharmacy.—Samuel A. D. Sheppard, George F. H. Markoe, Edward S. Kelly, John E. Groff, Charles P. Orne.

Alumni Association Philadelphia College of Pharmacy.—George W. Kennedy, Norman J. Bruner, Charles W. Hancock, Thomas A. Cheatham, Hugh White.

Connecticut Pharmaceutical Association.—John K. Williams, Almer F. Wood, J. Olmsted, E. S. Sykes, F. S. Stevens.

King's County Pharmaceutical Society.—Edward R. Squibb, M.D., Henry J. Menninger, M.D., G. M. Baker, Barent F. B. Livingston, Julius L. A. Creuse.

New Hampshire Pharmaceutical Association.—Charles A. Tufts, Elias S. Russell, Charles S. Eastman, Charles F. Hildreth, Benjamin F. Rackly.

Newark Pharmaceutical Association.—Charles B. Smith, Charles H. Dalrymple, Ransford W. Vanderwort, Charles Holzhauer, Edward P. Nichols.

South Carolina Pharmaceutical Association.—Benjamin F. Moise, Gustavus Luhn, Edward S. Burnham, Charles C. Michaelis, William A. Gibson.

Georgia Pharmaceutical Association.—Theodore Schuman, William A. Taylor, Thomas L. Massenberg, Homer P. Tarrant, E. W. H. Hunter.

Augusta Pharmaceutical Association.—O. L. Smith, U. T. Reaney, D. G. Sheahan, S. C. Dunbar, F. A. Beall.

Alumni Association of St. Louis College of Pharmacy.—John W. Tomphorde.

St. Louis College of Pharmacy.—Herman E. Lindeman.

Literary and Scientific Society of the German Apothecaries of the City of New York.—Henry J. Menninger, Charles Eimer, Adolph T. Schepp, F. Alfred Reichardt, Paul Balluff.

Richmond Pharmaceutical Association.—T. Roberts Baker, John B. Purcell, Powhatan E. Dupuy, J. W. Pierce, Henry Bodeker.

Ontario College of Pharmacy.—E. J. Waugh, H. J. Rose, alternate.

(Signed) G. J. Luhn,
F. T. Whiting,
Elias Russell,
Committee.

On motion the report was accepted, and the gentlemen accredited were admitted as delegates.

The Secretary called the roll, when forty-eight members answered to their names.

The Executive Committee reported the following applications for membership, the candidates having complied with the requirements of the by-laws:

California.

H. J. Finger, Santa Barbara.

Connecticut.

Emil A. Gessner, New Haven.

Florida.

Benjamin L. Hughes, Jacksonville.

Georgia.

Arch Avary, Atlanta.
L. H. Bradford, Atlanta.
R. T. Burnley, Athens.
Osceola Butler, Atlanta.
Asa Y. Candler, Atlanta.
William L. A. Ellis, Hawkinsville.
Charles H. Green, Atlanta.
Thomas S. Hawkins, Atlanta.
L. H. Hunt, Macon.
G. H. Morgan, Atlanta.
John L. Pinson, Atlanta.
J. W. Staunford, Cuthbert.
L. E. Welch, Albany.
St. J. R. Yonge, Savannah.

Indiana.

J. B. Dill, Indianapolis.
Eli Lilly, Indianapolis.
Emil Martin, Indianapolis.

Kentucky.

Russell Abell, Harrodsburg.

Maine.

Benjamin A. Perkins, Portland.

Maryland.

J. G. Hermann, Cumberland.
Steiner Schley, Frederick City.

Massachusetts.

Edmund C. Danforth, Cambridgeport.
Harry H. Stackpole, East Cambridge.

Mississippi.

Edgar Welery, Bay St. Louis.

Missouri.

William T. Ford, Kansas City.
G. H. C. Klie, Lowell, St. Louis.

New Hampshire.

Dominicus Hanson, Rochester.

New York.

George Inness, New York.
James H. Benjamin, Brooklyn.

North Carolina.

I. Bowden Mace, Beaufort.
James C. Munds, Wilmington.
E. V. Zoeller, Tarboro.

Ohio.

Edgar M. Hatton, Zanesville.
Norman A. Kuhn, Salem.
C. M. Miller, Mansfield.
Joseph S. Smith, Akron.

Pennsylvania.

Louis Emanuel, Pittsburg.
James C. Lechler, Danville.
F. W. Walker, New Brighton.
Nathaniel Wolfe, Wilkesbarre.

Texas.

J. T. Foley, Houston.
Rudolph Voelker, Galveston.
Eben M. Wells, Fort Worth.

Virginia.

W. B. Addington, Norfolk.

Canada.

Edmund Giroux, Quebec.

The chair appointed H. P. Tarrant, of Augusta, Ga., and Alonzo Robbins, of Philadelphia, tellers, who reported the unanimous election of the candidates.

Reports of Committees being called for, the following were read by their titles and laid upon the table for future action:

Report of the Executive Committee, with Report of Permanent Secretary.
Report of Committee on the Drug Market.
Report of Committee on Papers and Queries.
Report of Committee on Prize Essays.
Report of Committee on Legislation.
Report of Committee on Centennial Fund.
Report of Committee on Revision of the Pharmacopœia.

The Report of the Committee on Ways and Means was stated to be on the way to Atlanta, but has not yet been received. No information was obtained from the Committee on Metric Weights and Measures.

The Nominating Committee was appointed, as follows:

Massachusetts College of Pharmacy, ...	Charles A. Tefts.
New York College of Pharmacy, the King's County Pharmaceutical Association, and the Literary and Scientific Societies of the German Apothecaries of New York, ...	Henry J. Manninger.
Philadelphia College of Pharmacy, ...	James T. Shinn.
Louisville College of Pharmacy, ...	Emil Scheffer.
Alumni Association Philadelphia College of Pharmacy,	George W. Kennedy.
Connecticut Pharmaceutical Association, . . .	A. F. Wood.

New Hampshire Pharmaceutical Association, . .	Ch. S. Eastman.
South Carolina " " . . .	B. F. Moise.
Georgia " " . . .	Theodore Schumann.
Augusta " " . . .	O. L. Smith.
St. Louis College of Pharmacy, ...	H. E. Lindeman.
Alumni Association St. Louis College of Pharmacy, .	J. W. Tomphorde.
Ontario College of Pharmacy, ...	Henry J. Rose.

It was ascertained that the Colleges of Pharmacy of Chicago, Cincinnati, and Washington (National), the Pharmaceutical Associations of Newark and Richmond, and Alumni Association of the Massachusetts College of Pharmacy were not represented by delegates. The Secretary stated that several of the delegates of the Pennsylvania Pharmaceutical Association, with the credentials in their possession, were on their way, but had not yet arrived. On motion, Mr. Charles T. George was invited to act on behalf of the Pennsylvania delegation.

As additional members of the Nominating Committee, the chair appointed the following members, who were not delegates, from the Association at large: P. C. Candidus, Mobile, Ala.; A. A. Menard, Macon, Ga.; George W. Sloan, Indianapolis, Ind.; J. U. Lloyd, Cincinnati, O., and H. E. Griffith, Niagara Falls, N. Y.

The Chairman of the Executive Committee read his annual report, as follows:

GENTLEMEN OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

In compliance with the by-laws the Executive Committee would most respectfully at this session submit for your consideration their yearly report.

The twenty-fifth volume of the Proceedings was issued in the early part of the month of January. The size of the volume, when compared with that of 1876, will be found much smaller, although on perusal the contents will compare favorably with any volume previously issued. It certainly is not inferior in interest and usefulness. A considerable portion of the book is taken up by the highly commendable Report on the Progress of Pharmacy, by the reporter, Professor Diehl, which occupies 310 pages; the reports of various committees, 61 pages, and the original papers and essays read at the meeting cover 77 pages. The balance of 299 pages is taken up by the minutes, discussions, the President's able and very interesting address, constitution and by-laws, roll of members, and index. Sixty-two wood-cuts, in explanation of drugs, chemicals, apparatus, etc., were kindly loaned by the publishers of "New Remedies," and the "American Journal of Pharmacy." The volume is certainly a valuable one, and should be in the library of all well-regulated pharmacies. The price of the volume has been fixed by your committee at $6, unbound, and $6.50, bound.

When the size of the last volume is compared with that of the year preceding it, members may have expected its issue somewhat earlier. The Permanent Secretary and the undersigned regret exceedingly that their appeals, which have been made so frequently in former years, to have all papers and reports ready at the annual meetings, and to furnish others, which have to be prepared afterwards, at the earliest date practicable, have again been passed by unobserved, or indifferently responded to in some cases, consequently extra labor became necessary in order to have the volume published so early.

So far as the Executive Committee have learned the type selected for the volume of 1876 has been generally accepted with much favor, and was retained for the last volume, thereby reducing considerably the number of pages without impairing its value.

As was stated in my last report, the likeness of our deceased member, Charles Tibbetts Carney, was published with the last volume. The excellent steel-plate engraving was obtained from the family of deceased at a considerable reduction. Fourteen hundred and fifty (1450) pictures were made, the total expense to the Association amounting to $78.95. The portrait is an excellent one, representing our deceased member when but thirty years old. Although departed from this life a decade and a half ago, and at so early a period of his life, he had nevertheless secured for himself the esteem and love of his fellow-members by his acknowledged ability as a pharmacist and chemist as well as by his genial disposition and uprightness.

Your committee have already completed arrangements to beautify the next "Proceedings" with the likeness of our departed co-laborer, Ferris Bringhurst, of Wilmington, Delaware. The deceased was well known to the older members of the Association. He died in the thirty-fourth year of his age, his death having been caused by an explosion of a retort in which he was preparing oxygen to illustrate a lecture upon water, before the Workingmen's Association, in whom he took a deep interest. Those who knew him intimately loved him affectionately. Many of you remember his countenance, indicative of a heart beating with kindness and sympathy towards all. His words, so gentle and plain, yet so decided and wise; his works, so charitable and benevolent. A brief obituary notice of him will be found in the "Proceedings" of 1871.

I would once more call the attention of those associations and colleges entitled to representation, that on application to the Permanent Secretary they can obtain blank forms of credentials, the object of which is to facilitate and hasten the business at and after the meetings, and I hope that in the future the various organizations will take notice and provide themselves with the necessary blanks.

REPORT OF MEMBERSHIP.

Number of members in good standing at last report,		1164
Number of new members elected at last meeting,	45	
Number of delegates who became members by signing the Constitution,	7	
Total new membership,		52
And making a total membership of		1216

LOSS IN MEMBERSHIP.

By resignation,	24	
Dropped from roll for various causes,	55	
By death,	12	
Total loss,	—	91
Leaving a balance in membership in good standing at this report of,		1125

REPORT OF HONORARY MEMBERS.

Number of members at last report,	20
Number elected at last meeting,	4
Total,	24

No losses during the year.

In the latter part of July and early in August the Permanent Secretary received a number of communications from members, representing different sections of the country, advising a change of place for the annual meeting, and to hold it either in Cincinnati or Indianapolis, or to postpone it till some time in November, in consequence of the spread of the yellow fever. The matter had assumed such proportions, that the Executive Committee were in duty bound to notice the numerous appeals, and the Permanent Secretary issued the following circular:

"PHILADELPHIA, August 5th, 1878.

"DEAR SIR: The Permanent Secretary having received several communications suggesting the postponement of the next meeting, or to hold it in another city, you are respectfully requested to communicate without delay your advice to the chairman of the Executive Committee, G. W. Kennedy, Pottsville, Pa., on the following questions:

"In view of the prevalence of the yellow fever in New Orleans, and its sporadic appearance in various places farther North, is it advisable to change the time of meeting at Atlanta from September 3d to November?

"Or is it advisable to meet September 3d in another city? Cincinnati has been suggested; also Indianapolis.

"Or should the meeting take place as fixed?

"There is a precedent in such an action being taken. In 1861 the meeting at St. Louis was NOT held."

These circulars were mailed to those members who were likely to be present, the officers, chairman of committees, most of the authorized agents, and in preference to those who were present when the vote was taken at Toronto.

In response to the circulars, I would report that I received answers to most of them, excepting those who were absent from home. I found there was quite a difference of opinion as to what course to pursue. Six favored Indianapolis, about an equal number Cincinnati; four to hold no meeting this year, but next year at Atlanta. Some three or four suggested Washington, and three Philadelphia or New York, whilst the balance advised to hold it in Atlanta as originally proposed at Toronto. Some twelve of the latter preferred a postponement till November; the remainder, about twenty, principally members from the South, favored September 3d, and as the weight of opinion was so largely in favor of the original time and place, I could come to no other conclusion than that for the interests of the Association no change should be made. I at once telegraphed the Permanent Secretary to proceed without delay to issue the notices to that effect.

The last of the notices had scarcely left the Secretary's office before I began to receive letters, urgently requesting a postponement till November, as the disease had began to spread to an alarming extent along the Mississippi and Ohio valleys, which would necessarily prevent those from that direction from attending who had intended to be present. At the same time a number had written that they were pleased the meeting would be held at the designated time, and as there were a great many alarmed as to their safety in travelling to and from the place of meeting, I considered it my duty to consult the Permanent Secretary as to the advisability of postponement, even at that late day, Sunday and Monday, August 18th and 19th. After discussing the subject for several hours, we came to the conclusion to hold the meeting September 3d, for the reasons which the following letter of the Secretary to the Local Secretary will explain:

"Mr. Kennedy has just left me after consulting again about the propriety of postponing the meeting until November, and we came to the conclusion to let it take place as fixed, September 3d. Our reasons are the following:

"1st. The meeting was fixed for Atlanta with the view of securing the attendance of the Southern druggists, and the responses obtained by Mr. Kennedy from Georgia, North Carolina, Virginia, Knoxville, and Louisville, and some other places, were strongly in favor of not postponing it. It is to be presumed, therefore, that the attendance from the States named will be satisfactory.

"2d. The attendance from the lower Mississippi was always small. At St. Louis only Mr. Larville, of Bolivar, Tenn., and Mr. Ash, of Jackson, Miss., attended; and from the information in the possession of the Secretary, it is our joint opinion, that probably not six would have come from those districts along the Mississippi where the yellow fever has appeared.

"3d. From long distances only a small number can be expected at any time; we, therefore, can calculate on no one from the Northwestern States, and in our opinion on very few only from St. Louis and the Ohio Valley (Kentucky excepted), whether we meet in September or November.

"4th. From east of the Alleghanies we expect a larger attendance, but to the best of our knowledge few only from east of Pennsylvania. On inquiry we have found, that some who intended going in September could not get off in November, while on the other hand some who cannot go in September would go in November. We have no means whatever of determining whether the number going to Atlanta would be larger in September or in November.

"5th. There may be a falling off from the Eastern States in consequence of the refusal of Life Insurance Companies to grant permits for the visit to Atlanta, but to what extent we cannot say. In one case it would cost the member probably about $300 to make his policies cover the 'extra risk;' in another case it was refused to take the 'extra risk' at any consideration; two cases that we know of are still pending. This is all the information we have on this subject. These cases are too few in number, but include some of the officers.

"6th. The President, Mr. Saunders, has assured us that he would approve any decision the Executive Committee would make in this question. Mr. Calder, of Rhode Island, is opposed to holding the meeting this year, and wants it postponed to October or November, 1879, at Atlanta. Mr. Steele, of San Francisco, cannot be consulted on account of the distance. Mr. Tarrant's views, we take it for granted, are those of Mr. Land, of Augusta, who in answer to my circular, expressed himself strongly against any postponement, and in view of all the above facts Mr. Kennedy and myself, now that the Secretary's invitations have been mailed (the last one August 17th), agree with this view, so that the majority of the committee are in favor of not making any change now. Should, however, for some other reason unknown to us, a postponement be desirable to the druggists of Georgia, please telegraph either to me or Mr. Kennedy; but it should be borne in mind that your convenience and that of the druggists of your section of the country is to be primarily considered, because the largest attendance has to come from that direction. The others must give up their individual preferences, and except for urgent reasons the action of the Association should not be interfered with."

A copy of this letter was sent, besides, to the Local Secretary, Mr. Rankin, also to the President, Mr. Saunders, and I believe several other officers. We bade the subject farewell, in hope that it was finally settled. I had no sooner returned home from Philadelphia, when I again was receiving telegrams and letters, even from those who had previously favored September 3d, asking, in the name of the Omnipotent, to postpone the meeting. Some even went so far as to hold me responsible for any deaths, should any result from contraction of the disease by exposure during their sojourn. This was a little more responsibility than I cared about assuming, so I telegraphed Professor Maisch to come to Pottsville at once; he did so, and the same night we telegraphed to some of the officers and members of the Executive Committee, asking again whether it be desirable to postpone the meeting. We received the following answer from Georgia: "Not the slightest danger; but owing to apprehensions of Eastern and Northern members, meeting had best be postponed." Signed, W. A. Taylor, Th. Schumann, and J. W. Rankin. The Southern members, for whose interest the Association was to meet, acquiescing in a postponement, we immediately issued the following circular, postponing the meeting till some time in November.

POTTSVILLE, PA., August 23d, 1878.

AMERICAN PHARMACEUTICAL ASSOCIATION: Guided by the advice and with the approval of the officers of the Association and of the pharmaceutists and druggists of Georgia, the Executive Committee announce that the Twenty-sixth Annual Meeting has been POSTPONED until some time in November.

From all the information in their possession the Executive Committee are still of the opinion that, at the time originally fixed for the meeting, Atlanta, Ga., would be as safe a place to visit as could well be selected. However, the spreading of yellow fever in the Mississippi Valley will keep many pharmaceutists at their posts, not only in the infected districts, but likewise in more distant localities; and an unnecessary alarm spread further North would very materially reduce the number of visitors from that section. On the other hand it is of paramount importance that the meeting at Atlanta be well attended from Georgia and the neighboring States, as well as from those East and West.

As soon as the necessary arrangements can be completed, the precise time at which the meeting will be held, will be announced by the President; and in due time the Secretary will issue notices, giving particulars. Members intending to attend the meeting will oblige the Secretary by notifying him.

G. W. KENNEDY,
Chairman Ex. Com., Pottsville, Pa.

JOHN M. MAISCH,
Permanent Sec'y, 145 N. Tenth St., Phila.

The applications for membership which have thus far been received, with their respective vouchers attached thereto, have been regularly filed, and will be reported for election at the proper time.

Before closing my report I have the sad and solemn duty to perform of announcing the names of quite a number of our fellow-members who have passed away from this world. So far as your chairman has been informed, the following is a list of those who have died since our last meeting.

GEORGE W. ANDREWS,	Baltimore, Maryland.
ASHEL BOYDEN,	Boston, Massachusetts.
M. S. BIDWELL,	Elmira, New York.
HENRY H. HUNT,	Balston Spa, New York.
JOSEPH WILLARD,	Chicago, Illinois.
DAVID SCOTT,	Worcester, Mass.
DANIEL HENCHMAN,	Boston, Massachusetts.
WILLIAM G. STEPHENS,	Yonkers, New York.
JACOB KRUMMECK,	Santa Fe, New Mexico.
ALFRED DAGGETT,	New Haven, Conn.
WILLIAM S. FOLGER,	Boston, Massachusetts.
RICHARD H. STABLER,	Alexandria, Virginia.

Dr. GEORGE W. ANDREWS died in Baltimore, September 12th, 1877, at the ripe age of seventy-six years. The deceased was born and educated in the city where he died. He commenced business on his own account in 1829, and was afterwards, for thirty years, a member of the firm of Andrews & Thompson. In 1871 he retired from active business. He was one of the founders, and for many years President, of the Maryland College of Pharmacy. Though not present at the organization of our Association, in 1852, he was paid the high compliment by the convention by electing him First Vice-President of the Association, and in 1856 and 1857 he served as President of the Association. He had been a member of the Maryland Academy of Sciences for over fifty-five years, and during his long life enjoyed and retained the reputation of reliability and scientific attainments as a pharmacist, activity and correctness in his business relations, and of being a good and useful man and citizen.

ASHEL BOYDEN died October 23d, 1877, of angina pectoris, in Boston, aged sixty-seven years. He was born in Walpole, Mass., October 31st, 1810. Served an apprenticeship to the apothecary business with James Kidder, of Medford. He began business with his brother Arnold on Beacon Hill in 1830 and continued in business in that vicinity up to the time of his death. He enjoyed the confidence of all in his business relations, and was highly esteemed by his patrons. His accommodating disposition, charitable feelings, strong friendship, devotion to business, and carefulness in the selection of his drugs, made him not only successful, but a very useful man in his profession. The deceased was a member of the Massachusetts College of Pharmacy, and at one time its Treasurer. Joined our Association at its first annual meeting in 1853, served one term as its Treasurer, and for a number of years has been a faithful attendant at our annual meetings.

MR. BIDWELL wrote his own obituary, excepting that portion fixing the hour of his death. I give it to you, word for word, as it was written by the deceased.

MARSHALL SPRING BIDWELL was born in June, 1835, in Toronto, Canada. Died at Elmira, New York, November 21st, 1877, after a long illness and decline. During his infancy his parents moved to New York city, where he was brought up. In 1852 he entered Columbia College, where he took a high stand in his class, which he maintained until near the close of the last term, 1856, when his health gave way, and he graduated by courtesy during his absence. For the next ten years he lived mostly in the country, in Western Massachusetts, battling with disease with varying success. It was during this period that, in consequence of medicine taken, his face acquired that bluish tint which has made him so noticeable among us. During one interval in these years he was apparently cured, and began the study of law in Columbia College Law School. His father was a prominent lawyer, and the son's highest ambition was to be his associate and, perhaps, successor. He enjoyed the study of the law and made good progress, but at the end of the first term his health failed again and he quitted the law forever. In 1866 he married a second cousin, Miss Alice C. Bidwell, with whom he enjoyed that domestic felicity which is the highest earthly happiness. In 1868 they moved to Sheffield, Mass., where Mr. Bidwell bought a small drug store and entered upon that business for which he was qualified by study, though without previous experience. Four years later (1872) he moved to Elmira, taking the well-known stand of Dever & Morse. Since then his course is well known to our readers. The deceased connected himself with our Association in 1871 at St. Louis.

MR. H. H. HUNT died August 31st, 1877, at Balston Spa, N. Y., of consumption, aged twenty-seven years and ten months. Mr. Hunt was born at Edinburgh, N. Y., in 1849. Selecting pharmacy as a profession, he entered the drug house of G. M. Winnie, of Balston Spa, and subsequently formed a copartnership with his preceptor, under the firm style of Winnie & Hunt. On the death of Mr. Winnie, which occurred shortly afterwards, Mr. Hunt became sole proprietor, and continued in the same place of business in which he first entered, having passed through the various grades of apprentice, clerk, partner, and proprietor. Deceased leaves a wife and two children. He became a member of our Association at Philadelphia in 1876.

MR. JOSEPH WILLARD, of Chicago, Ill., died in that city, December 29th, 1877, of paralysis, in the sixty-eighth year of his age. The deceased was born January 8th, 1810, in Petersham, Worcester Co., Mass., where he resided most of his time until 1840, from which place he removed to Keene, N. H., where he went into the drug business on his own account, having been previously employed in Springfield and in Boston, and in the meanwhile became a member of the Massachusetts College of Pharmacy. In March, 1854, he removed to Chicago. Mr. Willard is spoken of as being of a kind and amiable disposition. He was an enthusiast in his chosen business, never happier than when busily engaged in it. Of late years, during his failing health, he often thought of retiring from business; but then the question would arise, What shall I do? His active mind could not endure idleness, and so he worked on, and fell at last, as he often wished he might, with the harness on. Having been taken ill December 27th, he lingered, gradually sinking, until December 29th, when, without a struggle, he calmly fell asleep. Mr. Willard was one of the oldest members of the Chicago College of Pharmacy, having joined it in 1859, two weeks after its organization. His connection with our Association dates back to 1865, at the meeting held in Boston.

MR. DAVID SCOTT died in Worcester, Mass., March 16th, 1878, of paralysis, aged fifty-six years. Mr. Scott served an apprenticeship to the drug and apothecary business in Worcester, in which place he began business for himself and continued successfully, without interruption, for a period of over thirty-eight years, until his health began to fail him, when he was compelled to retire from active business the remainder of his days. Mr. Scott was an estimable gentleman, loved and respected by his numerous friends for his kind and generous disposition. He also commanded the respect of his fellow-associates in business in the city where he resided. In proof of their esteem and regard, a meeting of the apothecaries of Worcester was called, at which resolutions of regret at his demise were passed. The deceased was a member of the Massachusetts College of Pharmacy, and his connection with our Association dates from 1855.

MR. DANIEL HENCHMAN, of Boston, Mass., died in his native city, April 13th, 1878, at the advanced age of eighty-eight years; he was probably the oldest druggist in the United States. Mr. Henchman was born in Boston in 1790. In 1814 he purchased a lot and erected a store and dwelling thereon, in which building he did business up to the time of his death. The lower floor was originally divided into two stores, one of which was occupied by the deceased, and enlarged by the addition of the other store when this was vacated by its first tenant. Deceased in this place carried on the apothecary business for sixty-three years, and the store to this day presents an ancient appearance. In it may be seen long rows of old-fashioned, plain, blown glass jars, capped with tin covers, painted green and ornamented with quaint and elaborate labels, consisting of grotesque figures, scroll work, and letters in gilt and yellow. Several shelves are filled with earthen jars of various shapes, and decorated after the style known to pottery dealers of "flowing blue." The only modern embellishment is a small soda fountain. The deceased was a member of the Massachusetts College of Pharmacy, and at a very early date its President; was also a member of the Boston Druggists' Association. He is spoken of as being a man of strict integrity, devoted to his profession to the last, faithful to his trusts, public and private. At a meeting of the druggists of Boston to take suitable action relative to the deceased, a committee to prepare suitable resolutions was appointed, and a copy of which was presented to the family. Mr. Henchman was one of the oldest members of our Association, having joined the organization in 1853.

MR. WILLIAM G. STEPHENS, of Yonkers, N. Y., died there very suddenly, of apoplexy, July 30th, 1878. Mr. Stephens was born in 1837, and at the time of his death was forty-one years old. Deceased lived in Yonkers about twenty years. When he first arrived there he entered the drug store of Dr. Rees, and continued in his employ a number of years. In 1866 he engaged in the drug business with J. Barnard as partner; after three years a dissolution was effected, Mr. Stephens continuing the business up to the date of his death. He was peculiarly beloved by his family and friends, and thoroughly esteemed by the community as a kind, upright, and fair-dealing man, and a conscientious, good pharmacist. Mr. Stephens became a member of our Society at the ninth annual meeting, held in the city of New York.

MR. JACOB KRUMMECK, of Santa Fe, New Mexico, died there May 19th, 1878, very suddenly, of apoplexy. The deceased became a member of our Association in 1867.

MR. ALFRED DAGGETT, JR., of New Haven, Conn., died August 30th, 1878, aged forty-one years. The deceased was born in the city of New Haven, August 23d, 1837. He began the study of pharmacy at the age of fifteen in his native city. After having acquired a rudimentary education, he left his native place and accepted a situation in the employ of Messrs. Scheffelin & Co., of New York city, with whom he remained several years. For a few years he was apothecary at the Insane Asylum in Utica, New York. In 1858 he returned to New Haven, purchased a drug store, and commenced business on his own account, where he remained till 1877, when his health began to fail him, and he was obliged to dispose of his shop and retire from business. The deceased is spoken of as having been a man highly esteemed and respected. He was considered one of the best pharmacists in the city of New Haven. He labored energetically for the advancement of the profession of his choice. Through his instrumentality the Connecticut Pharmaceutical Association was formed. In 1876 to 1878 he held the office of Secretary, and owing to loss of sight was compelled to resign. Mr. Daggett became a member of our Association in 1865 at Boston.

MR. WILLIAM S. FOLGER, of Boston, died there quite suddenly on September 8th, 1878, of apoplexy, aged forty-two years. Mr. Folger was born at Nantucket, August 20th, 1836. At the age of sixteen he began the study of pharmacy with Dr. Thomas Jenkins, of Boston, in whose employ he remained a number of years. About ten years ago he commenced business on his own account. Several years previous to his death he held a prominent position in the Boston College of Pharmacy, being elected unanimously President, but declined to serve in that capacity. He was, however, induced to take the office of Vice-President, which position he held until his death. The deceased was elected a member of our Association in 1875 at the meeting held in Boston.

RICHARD H. STABLER, M.D., died November 18th, 1878, aged 58 years. He was born and educated at Alexandria, Va., learned the drug business with his father, and afterwards studied medicine at the University of Pennsylvania. He engaged in the drug business in Alexandria, and was elected Professor of Pharmacy in the School of Pharmacy of the National Medical College, and afterwards of the National College of Pharmacy at Washington. He became a member of this Association in 1856, and was elected President for the year 1870–71.

The above report contains everything your chairman thought would be of sufficient importance to speak of. In conclusion, I wish to return my heartfelt thanks to the Permanent Secretary, and all officers and members of the Association who assisted me so cheerfully whenever called upon.

GEORGE W. KENNEDY,
Chairman Executive Committee.

POTTSVILLE, PA., Nov. 20th, 1878.

The Permanent Secretary read the following report:

REPORT OF THE PERMANENT SECRETARY.

TO THE CHAIRMAN OF THE EXECUTIVE COMMITTEE:

After the last annual meeting the minutes and various papers and reports read at that meeting were arranged and placed into the printer's hands, and were expected to have been published about a month sooner than the previous two volumes; but the unexpected delay in furnishing the editor of the Proceedings with certain reports, caused a correspondingly greater delay in furnishing the volume. However, it made its appearance about the same time as the two larger ones just preceding it. These delays have repeatedly been the cause not only of annoyance to the editor, but likewise of delay in the publication; but it is hoped that in the future they may be entirely avoided.

The illustration of the Proceedings with woodcuts has been very generally approved and favorably commented on. Their preparation involves a considerable item of expense to the Association. It is, therefore, with much pleasure that the Secretary reports that a considerable number of the cuts used for the illustration of the last volume have been kindly loaned for the purpose by the publishers of *New Remedies* and of the *American Journal of Pharmacy.* The saving of expenses to the Association in this respect was considerable; and this, as well as the courtesy shown by this act, deserves proper acknowledgment. A similar courtesy was shown by Mr. G. J. Carney, of Lowell, Mass., in defraying nearly one-half the expense of the excellent portrait of his brother, our lamented fellow-member, Charles T. Carney, which embellishes the last volume.

The expenses of publishing the last volume of Proceedings were as follows:

Phonographic Report,	$200 00
Woodcuts,	69 00
Steel engraving (exclusive of Mr. Carney's contribution towards it),	78 95
Composition, Paper, and Printing,	1374 10
Binding,	311 84
Journals for use of Reporter on Progress of Pharmacy,	57 30
Salaries of Reporter and Secretary,	1100 00
Incidental (not including travelling) expenses of the Secretary,	348 87
Total,	$3540 06

This sum does not include the salary and incidental expenses of the Treasurer. The incidental expenses of the Secretary were as follows:

Telegrams,	$20 38
Packing-boxes, etc.,	10 43
Freight and expressage,	96 15
Postage stamps,	126 00
Journals not otherwise accounted for,	21 51
Circulars and Stationery,	73 00
Filling up certificates,	1 40
Total,	$348 87

The items of freight, expressage, and postage stamps, the largest portion of which is paid for distributing the Proceedings, amounted during the past year to $222.15, against $239.62 during the preceding year. The expenses for telegraphing and for circulars were mostly incurred pending the postponement of the meeting.

According to the by-laws only those members are entitled to a copy of the printed Proceedings who have paid their contribution for the current year. The Proceedings are therefore withheld from all who are in arrears, though occasionally they may be delivered through mistake. But if the delinquents afterwards pay up, they become entitled to a copy for that year, and this must usually be sent by mail, while previously it might often have been sent with others by express or otherwise. Members, in permitting themselves to get in arrears with their dues, not only deprive the Association of the use of the money for a shorter or longer time, but they cause additional labor to both the Treasurer and Secretary, and entail additional expenses upon the Association. It is believed that if members would consider the above, these facts would probably make them more prompt in their payments for the future.

The stock of Proceedings on hand and stored in the building of the Philaphia College of Pharmacy, is as follows:

1851.	313	in paper.				1866.	72	in paper,	82	bound.
1852.	94	"				1867.	152	"	88	"
1853.	91	"				1868.	61	"	152	"
1854.	64	"				1869.	104	"	145	"
1855.	107	"				1870.	113	"	73	"
1857.	253	"	18	bound.		1871.	99	"	65	"
1858.	58	"	13	"	130 loose.	1872.	100	"	4	"
1859.	—	"	48	"		1873.	22	"	91	"
1860.	—	"	208	"		1874.	134	"	25	"
1862.	—	"	283	"		1875.	68	"	42	"
1863.	—	"	262	"		1876.	47	"	56	"
1864.	183	"	115	"		1877.	56	"	84	"
1865.	154	"	27	"						

The difference between the above and the preceding reports is accounted for on the one hand by the sale of several sets of the older, and some of the new volumes, and by delinquents in previous years having discharged their indebtedness and becoming entitled to the volumes; and, on the other hand, to the returning of a number of volumes from several authorized agents of the Association, by whom they had been withheld from delinquent members in accordance with the by-laws. The insurance on the above stock and on the other books of the Association has been continued in the German Fire Insurance Company of Philadelphia, in the sum of $2500, at an annual premium of $15.

The sale of badges during the past year has realized $20, and it is expected that in another year, by the sale of most of the remaining badges, the sum paid for the dies and badges will have been again paid back into the treasury. The badges for several committee members, which belong to the Association, and were procured solely for the use of the officers and committees during the annual meeting, and intended to be preserved by the Secretary from one meeting to the next, have not been returned; and it is urged upon those who may have them in their possession to forward them without delay to the Secretary.

The request made in last year's report, that the Secretary be furnished with the address of the presidents and secretaries of the various local pharmaceutical associations, has been responded to by few of the societies. In order to avoid the unnecessary correspondence frequently resulting from such omission, it is now suggested that the delegates to the present and to the future meetings be requested to furnish this information, and that the names and addresses of the two officers named of each society represented at the meeting be published in the Proceedings.

The diplomas conferring honorary membership upon Professors H. A. L. Wiggers, of Göttingen, G. Planchon, of Paris, Ed. Schaer, of Zürich, and H. Landerer, of Athens, who were elected at the last meeting, have been duly forwarded, and replies have been received from all, accepting this mark of esteem and expressing their thanks.

A short time after the adjournment of the twenty-fifth annual meeting the Secretary received a letter from a committee of the Pharmaceutical Society of Great Britain, inviting the members of the American Pharmaceutical Association to contribute to the Hanbury Memorial Fund, founded in commemoration of the late Daniel Hanbury, and which is intended to be used in aiding original research. Since our Association has no official organ, except the annual Proceedings, the subject of this communication could not be brought to the notice of the members before the present time; in the meantime, however, official information has been received that the subscription list to that fund was finally closed June 24th last.

During the past spring and summer the Secretary has been in frequent communication with the Local Secretary in relation to the twenty-sixth annual meeting, and when the arrangements made by the latter and the local committee at Atlanta were completed, and the usual notification ready to be issued, the Secretary received several letters urging strongly a postponement of the meeting, owing to the appearance of yellow fever in New Orleans and elsewhere, which induced him to issue a circular, and to send this only to such members whose intention to be present at Atlanta was known, or, in the absence of such knowledge, whose opinion and advice was sought as an expression of the sense of the members in their respective localities, but in no case was the circular sent to a member whose inability to be present at Atlanta in September was previously known, the object being to divest the decision on the question of postponement as completely as possible from personal motives. All other steps were taken in conjunction with the chairman of the Executive Committee.

It is but proper to state in this connection, that the postponement of the meeting was opposed by one of the most valuable members of the Association on the ground that the Executive Committee and officers had no authority for such action. The Secretary begs to differ from this view, and believes that the power for such action is clearly implied by Chapter viii, Art. i of the by-laws, which is as follows:

"ARTICLE I. The meetings shall be held annually; provided, that in case of failure of this from any cause the duty of calling the Association together shall devolve upon the President or one of the Vice-Presidents, with the advice and consent of the Executive Committee."

That this power should not be wantonly exercised, is of great importance; but on the other hand it seems to be equally important that such power should be vested in some one, so as to guard against the possibility of failure from causes which would become inoperative by postponement or change of locality.

But the difficulty experienced by the officers and Executive Committee with regard to postponement and again appointing a suitable time for holding the meeting, has convinced the Secretary that the whole subject deserves the serious consideration of the Association and of all its members, and he begs leave to offer a few remarks on this subject:

It will be readily conceded, that since our membership extends over the entire North American continent, since it is intended to embrace all reputable pharmaceutists and druggists residing therein, and since the meetings are migratory, that all sections of this continent have a like claim on the Association, and that this claim should be recognized and satisfied with equal justice to all. It seems, therefore, but proper that the meetings should be held as nearly as may be possible alternately in different sections of the country, and in one about as frequently as in the other in which an equal interest is shown in the Association and its objects. To make the meetings successful, the time for the same should be so fixed as to suit best the section of country in which the meeting is to be held, and the members living in other parts should endeavor to so arrange their private affairs, if possible, as to be able to attend the meeting at whatever time it may be held. If these views are correct, it would follow that various portions of the continent have not been visited by the Association as frequently as under other circumstances would or should have been done. Various parts of the West, perhaps the extreme East, and notably the South and Southwest, have not been visited as often as the field to be cultivated deserves. The difficulty in regard to the Southern States, it seems to the Secretary, has never been properly presented to the Association. The Northern members who generally attend the meetings dread to visit the South at certain seasons of the year, even if there be no epidemic prevailing, dreading the effects of the heat and of climatic exposures, whether properly or improperly so is not for the Secretary to decide. On the other hand, the Southern members are often unable to leave their posts of duty at that season when the meetings have generally been held. To harmonize these seemingly antagonistic claims, some members have suggested to the Secretary the propriety of changing the time of our annual meetings from autumn to spring. Obviously the adoption of such a course would meet with many, perhaps insurmountable difficulties; and while the Secretary is not prepared to recommend or advocate such a change, the meeting at Atlanta appears to him to be the proper place and occasion to elicit an expression as to the best time for holding any future meeting south of the Potomac and Ohio, and for securing the largest possible attendance of the pharmacists and druggists of that vast section of the North American continent. The Secretary is aware that objections may be brought forward against any departure from the custom heretofore followed, unless that departure be made general; but he believes that the difficulties to be overcome are overrated, and he is prepared to state and explain his views concerning these difficulties either before a special committee or before the Association, if the subject should be deemed of sufficient importance for further consideration.

Respectfully submitted,

JOHN M. MAISCH,
Permanent Secretary.

Mr. George moved to accept both reports, and to refer the suggestions contained in the Secretary's report to the Committee on the President's Address. The motion was agreed to, and the chair appointed Messrs. James T. Shinn, of Philadelphia, John Ingalls, of Macon, Ga., and F. T. Whiting, of Great Barrington, Mass., said committee.

The following invitation was read by the Secretary, and on motion accepted with thanks:

> The druggists of this city most cordially invite the members of the Association, the visiting ladies, and the exhibitors, to be present at the complimentary dinner to be given in this hall to-morrow evening at six o'clock.

The President appointed the following Committee on Specimens: Charles Mohr, of Alabama, Henry J. Rose, of Canada, Emil Scheffer, of Kentucky, Jesse W. Rankin, of Georgia, and Charles W. Hancock, of Pennsylvania.

On motion of the Business Committee, the Association adjourned until half-past nine o'clock on Wednesday morning.

Second Session.—Wednesday Morning, Nov. 27th.

President Saunders called the Association to order at 10 o'clock. The minutes of the first session were read by the Secretary and approved.

The credentials of the Pennsylvania Pharmaceutical Association were presented and read by the Secretary. The accredited delegates are, J. L. Lemberger, G. W. Kennedy, J. L. Patterson, Charles T. George, and George Ross.

The Secretary also reported that the Kentucky Pharmaceutical Association had appointed a full delegation, of which number only Mr. Jesse T. McKenney was present, and that according to information received from the members of that State association here present, the credentials were in the hands of the chairman of that delegation, who intended to be present, but had not arrived. It was then, on motion, resolved that the delegation of the Pennsylvania Pharmaceutical Association be admitted, and that Mr. J. T. McKenney be admitted as delegate of the Kentucky Pharmaceutical Association.

The report of the Nominating Committee was read, as follows:

> The committee appointed to nominate officers, would respectfully submit the following report:

President.

GUSTAVUS J. LUHN, ... Charleston, S. C.

First Vice-President.

FREDERICK T. WHITING, ... Great Barrington, Mass.

Second Vice-President.

Heny J. Rose,	Toronto, Ontario, Can.

Third Vice-President.

William H. Crawford,	St. Louis, Mo.

Treasurer.

Charles A. Tufts,	Dover, N. H.

Permanent Secretary.

John M. Maisch,	Philadelphia, Pa.

Reporter on Progress of Pharmacy.

C. Lewis Diehl,	Louisville, Ky.

Executive Committee.

George W. Kennedy (Chairman),	Pottsville, Pa.
William S. Thompson,	Washington, D. C.
Walter A. Taylor,	Atlanta, Ga.
James W. Mill,	Chicago, Ill.
John M. Maisch, Permanent Sec'y, *ex-officio*,	Philadelphia, Pa.

Committee on Drug Market.

William H. Wickham (Chairman),	New York.
T. Roberts Baker,	Richmond, Va.
Isaac L. Lyons,	New Orleans, La.
James G. Steele,	San Francisco, Cal.
Solomon Carter,	Boston, Mass.

Committee on Papers and Queries.

Emil Scheffer (Chairman),	Louisville, Ky.
Theodore Schumann,	Atlanta, Ga.
John F. Judge,	Cincinnati, Ohio.

Business Committee.

Henry J. Menninger (Chairman),	Brooklyn, N. Y.
Charles L. Eberle,	Philadelphia, Pa.
John U. Lloyd,	Cincinnati, Ohio.

Committee on Prize Essays.

C. Lewis Diehl (Chairman),	Louisville, Ky.
John F. Judge,	Cincinnati, Ohio.
Emil Scheffer,	Louisville, Ky.

Committee on Legislation.

John M. Maisch (Chairman),	Philadelphia, Pa.
Jesse W. Rankin,	Atlanta, Ga.
Philip C. Candidus,	Mobile, Ala.

(Signed) Charles A. Tufts, *Chairman.*
George W. Kennedy, *Secretary.*

It was moved that the Association proceed to ballot for President. Mr. Land, of Georgia, moved to amend that the ballot be taken for all the nominees. The amendment was not carried, and the question recurring on the original motion, it was adopted.

Messrs. McKenney, of Kentucky, and Patterson, of Pennsylvania, were appointed tellers, and after collecting the ballot reported the election of Mr. G. J. Luhn as President of the Association.

The Business Committee moved that the Secretary be directed to deposit an affirmative ballot for all other nominees. The motion was adopted, and all nominees were declared to have been duly elected.

Messrs. Scheffer, of Louisville, and Shinn, of Philadelphia, were appointed a committee to conduct the President elect to the chair. On reaching the platform Mr. Luhn was presented to President Saunders, who invested his successor with the badge of his office, and made the following remarks:

Gentlemen: I have much pleasure in introducing to you the President elect, Gustavus J. Luhn, of South Carolina, a gentleman who, I have no doubt, will fill the office to which you have elevated him with credit both to himself and the Association. And while thus formally transferring to my successor the honor and responsibilities attached to this high position, I desire to return my best thanks to my fellow-officers of the last year, for the kind and prompt manner in which they have, on many occasions, aided me in my endeavor to fulfil to the best of my ability the duties devolving on me.

On taking the chair the President elect addressed the Association as follows:

Gentlemen of the American Pharmaceutical Association:

I beg leave to return thanks to you for the honor you have just conferred upon me. I accept it at your hands, and although it comes very unexpected to me, I shall do my utmost to merit the confidence you have seen fit to bestow on me. There are others better fitted for the position of your presiding officer and whose merits rank far above mine, and who, at the same time, are more accustomed to preside and speak in public than I am. I therefore beg you to bear with my faults.

You all know that I have taken a very lively interest in the advancement of pharmacy, especially here at the South, where our profession has not attained that high rank it has at the North and West; it shall be my special duty to advance the cause and increase the membership of the American Pharmaceutical Association, and I hope the next time the Association meets in a Southern city, its membership may be tenfold what it now is.

Messrs. Whiting and Rose, the Vice-Presidents elect, were introduced to the Association by President Luhn.

The Secretary read a communication from Messrs. Burke & Ranson, inviting the members to visit their paper-box factory on Alabama Street, and their store on Marietta Street. The invitation was accepted with thanks.

The Treasurer read the following annual report:

TO THE OFFICERS AND MEMBERS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

GENTLEMEN: It is expected of the Treasurer that at each annual meeting of the Association, he will render an account of his stewardship for the past year, and to realize that expectation I present the following report. I am not aware of any bill unpaid, and there is a balance in the treasury of $862.11. This sum does not include the Ebert fund and the amount received for a life membership, which is invested, and the interest of which only is used.

I wish I could report a larger amount in my hands, but this is more than I at one time feared I should have. This has been the most difficult year for collecting since I have held this office; and this is not only my own experience, but it is that of the accredited agents of the Association. The general depression of business for the past five years has, it seems to me, been more keenly felt by our profession than by most business men. While goods were advancing in price, the pharmacist could not advance his prices in proportion; his expenses continued as before and his profits grew smaller. When prices began to decline, he was left with goods costing nearly as much as he could realize from them, and with the loss of his time and labor. This condition of affairs has affected nearly all of our members, and renders it difficult for many of them to retain their membership.

We have a large number who are liable to be dropped from the rolls. I have received letters from members in different parts of the country, writing that they would as soon as possible pay a part, if not all of their indebtedness. I feel disposed, when there is a disposition to reduce indebtedness, to be as lenient to such members as the interests of the Association will allow. It is thought by those who are best informed that the tide of prosperity has again begun to flow, and we hope when another meeting calls us together we may report upon a better state of affairs than for several years.

Since our last meeting, I have made a synopsis of each member's account, and all the accounts have been transferred to a new ledger from the two ledgers heretofore used by the Treasurer.

In my report last year, I alluded to the large number of members who had resigned, on being dropped from the rolls for non-payment of dues, but who had not returned their certificates of membership. I have obtained a few more of these certificates since our meeting ; there is still a large number not yet returned. During the year, the Treasurer will continue to request these gentlemen to fulfil the promise made by them when they became members of the Association.

Death has made inroads upon our ranks, and we have lost some of our oldest and most valued members. The Executive Committee will make suitable mention of our departed friends.

I return my thanks to the agents of the Association for their valuable assistance, and to the members generally for our pleasant intercourse of the past year.

Statement of the Receipts and Disbursements of the American Pharmaceutical Association for the year ending September 3d, 1878.

1877.	RECEIPTS.	
Sept. 7.	To balance on hand as per last Report,	$954 39
1878.		
Sept. 3.	To amount received for Contributions,	4090 00
" "	" " " from the sale of Proceedings,	79 10
" "	" " " " Ebert Fund,	30 00
" "	" " " " George J. Carney,	50 00
		$5313 49

1877.		DISBURSEMENTS.	
Sept. 7.	No. 1.	By cash paid C. Lewis Diehl, Report,	$350 00
" "	" 2.	" " Joseph P. Remington, Expenses,	30 08
" "	" 3.	" " John M. Maisch, Expenses,	39 00
" "	" 4.	" " James H. Slade, Phonographic Report,	100 00
" 20.	" 5.	" " C. Lewis Diehl, Report,	150 00
Oct. 1.	" 6.	" " George W. Kennedy, Expenses,	29 50
" 20.	" 7.	" " William H. Clark, Proceedings,	69 00
" 30.	" 8.	" " H. B. Hall & Sons, Proceedings,	128 95
Nov. 4.	" 9.	" " John M. Maisch, Expenses,	31 05
Dec. 7.	" 10.	" " James H. Slade, Phonographic Report,	100 00
" 12.	" 11.	" " Charles A. Tufts, Expenses,	67 80
1878.			
Feb. 27.	" 12.	" " Sherman & Co., Proceedings,	600 00
May, 7.	" 13.	" " Ig. Kohler, Expenses,	40 50
" 28.	" 14.	" " John M. Maisch, Expenses,	209 99
June, 6.	" 15.	" " John M. Maisch, Expenses,	125 00
" 27.	" 16.	" " John M. Maisch, Expenses,	150 00

1878.				
July, 3.	No. 17.	By cash paid	John M. Maisch, Expenses, .	$200 00
" 25.	" 18.	" "	William Rutter & Co., Proceedings, ...	200 00
" 27.	" 19.	" "	Ig. Kohler, Expenses, . . .	16 80
" 31.	" 20.	" "	Sherman & Co., Proceedings, .	300 00
Aug. 8.	" 21.	" "	William Rutter & Co., . . .	111 84
" 9.	" 22.	" "	Charles Rice, Pharmacopœia Committee, ...	50 00
" 24.	" 23.	" "	Sherman & Co., Proceedings, .	474 10
" 30.	" 24.	" "	Frederick B. Power, Ebert Prize,	30 00
" 31.	" 25.	" "	Charles A. Tufts, Expenses, . .	800 00
Sept. 1.	" 26.	" "	John M. Maisch, " . .	125 00
" "	" 27.	" "	Charles A. Tufts, " . .	82 68
" "	" 28.	" "	Charles A. Tufts, " . .	69 87
" "	" 29.	" "	John M. Maisch, " . .	70 22
				$4451 38
			Balance to new account, ...	863 11
				$5313 49

E. E. All which is respectfully presented.

Charles A. Tufts,
Treasurer.

The report was, on motion, received and ordered to be referred to an auditing committee of three. The chair appointed to this duty, Messrs. J. L. Lemberger, of Pennsylvania, B. F. Moise, of South Carolina, and G. W. Sloan, of Indiana.

The report on the Drug Market (see page 645) was read by Mr. Menninger, and on motion referred for publication.

The Secretary read the following, which was likewise referred:

To the President of the American Pharmaceutical Association.

The Committee on Prize Essays would respectfully report, that having carefully examined all the original essays presented at the Twenty-fifth Annual Meeting of the American Pharmaceutical Association, they have unanimously, and independently of each other, decided to award the "Ebert Prize," for the year 1877, to Mr. Frederick B. Power, for his essay, "On the Resin of the Rhizome of Podophyllum peltatum, Linn."

The considerations that prompted the committee to make the award to Mr. Power were:

1. The evidently scrupulous care in the identification of the drug and in the execution of the experiments which the author conceived to be necessary, thereby insuring a series of results that will stand conclusive for the sample of podophyllum rhizome experimented with.

2. The results, which are confirmatory in some directions and contradictory in others, contribute materially to our knowledge of the constituents of the

podophyllum rhizome, and, if not conclusive, are calculated to incite renewed investigation, particularly as regards the hitherto undisputed presence of berberia in the drug.

The committee do not consider it expedient to subject the essay to a nearer criticism. The results obtained by Mr. Power may be disputed or confirmed by future experimenters; but they have, beyond a doubt, rendered the existence of berberia as a constituent of the rhizome of Podophyllum peltatum questionable, and clearly prove its absence in the particular sample examined by Mr. Power.

A strict interpretation of the "by-law" governing the action of this committee prevents direct reference to other meritorious essays that were selected by the committee for special consideration.

C. LEWIS DIEHL,
J. F. JUDGE,
E. SCHEFFER.

CINCINNATI, June 19th, 1878.

The Permanent Secretary stated that the complete report on the Progress of Pharmacy had been received by him from Professor Diehl two months ago. That the report was a very thorough and voluminous one; but that he had omitted to send it on to Atlanta. He asked to be excused for the oversight, and moved the reference of the report for publication. It was so ordered.

The report of the Committee on Legislation was read by the chairman and referred. (See page 662.)

Mr. Kennedy read the following report in reference to the "Centennial Fund."

TO THE OFFICERS AND MEMBERS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The Committee on "Centennial Fund," created at our last meeting, would most respectfully submit their report at this session.

Immediately after adjournment of last meeting your committee had two thousand of the following circulars printed.

POTTSVILLE, PA., 187 .

TO THE MEMBERS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

GENTLEMEN: The pharmacists and druggists of Philadelphia and vicinity, through the Committee of Arrangements for the meeting of 1876, have presented to the American Pharmaceutical Association the sum of $525, with the condition that at least a like amount be subscribed by the members within one year, and paid before September next. The fund is to be known as the "Centennial Fund" of the American Pharmaceutical Association. The money is to be invested and the interest only used for defraying the actual expense of investigations, the results of which are to be reported in full to the Association and published in the Proceedings.

It is confidently expected that every member of the Association will recognize the importance of having such a scientific research fund, since it will warrant many investigators to perform the requisite experiments with larger quantities of material than would otherwise be the case; or to undertake researches for the benefit of the profession, which, from their cost, might have been left undone; and, admitting the importance, it is hoped that members will endeavor to make this fund as large as possible and contribute to it liberally, so that the annual interest may be large enough to extend the aid freely.

The undersigned have been appointed a committee to obtain subscriptions and receive aid and invest the funds thus obtained.

They appeal to every individual member, in furtherance of the object, to contribute liberally and send their donations to the undersigned, chairman of the Executive Committee, who will promptly acknowledge all contributions and account for them at the next annual meeting. This "Centennial Fund" will then further stimulate scientific researches within the body of the Association, which cannot but reflect credit upon and result in the direct benefit and increased knowledge of the members,

Very respectfully,
(Signed), GEORGE W. KENNEDY, Ph. G.,
Chairman Executive Committee, Pottsville, Pa.
Prof. JOHN M. MAISCH,
Permanent Secretary.
Dr. CHARLES A. TUFTS,
Treasurer, Dover, N. H.

A copy of this circular was mailed to each member, excepting those members residing in Philadelphia and vicinity, who had previously contributed to the object.

It is very much to be regretted that the responses to the circular were so few. Only six members responded and subscribed. Other means of again calling the attention of members to this fund were resorted to, namely, notices were published in the "Druggists' Circular," "American Journal of Pharmacy," "New Remedies," and also on the Secretary's circular notification in relation to the present meeting; but have thus far only heard from one member.

STATEMENT.

Amount collected at Toronto by Mr. Tufts, . . .	$115
Amount received in reply to circulars, ...	48
Total amount collected, ...	$163

In accordance with the stipulations and requirements of the joint local committee of Philadelphia and vicinity, the Association would have no claim upon the money presented at Toronto, since we have failed to collect the amount specified in the limited time of one year; but at the request of the chairman the Joint Committee has extended the time for another year.

We would therefore ask that the committee be continued till our next annual meeting, feeling confident that on reading this report members will promptly remit a voluntary contribution, so that by that time the requisite sum may be raised.

GEORGE W. KENNEDY,
Chairman Executive Committee.
JOHN M. MAISCH,
Permanent Secretary.
CHARLES A. TUFTS,
Treasurer.

The report was, on motion, accepted and the committee continued for another year.

No report having been received from the Committee on Metric Weights and Measures, it was moved and carried that the committee be discontinued.

On motion of the Business Committee it was resolved that when the Association adjourns it will be to meet again at half past two o'clock in the afternoon.

The Association then proceeded, under guidance of the Committee on Exhibition, to examine the specimens, and subsequently adjourned.

Third Session.—Wednesday Afternoon, November 27th.

According to adjournment the Association met, Vice-President Whiting in the chair. The minutes of the second session having been read, they were, on motion, approved.

The chairman of the Executive Committee read the following report on the proposed abolishment of the Exhibitions, which proposition had been referred at the last meeting to the Executive Committee for consideration and report:

TO THE OFFICERS AND MEMBERS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

GENTLEMEN: The subject referred to the Executive Committee in reference to discontinuing the Exhibition at our annual meetings, would respectfully submit the following:

The undersigned committee feel constrained to differ with Mr. Wellcome, who offered the resolution, both as to the utility of the Exhibition and of the magnitude of the evils asserted to be inseparable therefrom. We are disposed to believe, from our knowledge of the Exhibitions at former meetings, that they have certainly been very useful, and decidedly instructive to most of the members, especially those residing remote from large cities, who have thus had opportunities, not otherwise enjoyed, of examining many crude drugs, rare chemicals, new pharmaceutical preparations and apparatus. On the other hand we are of the opinion that sometimes goods of such a character have been displayed which are of no benefit to the Association and should be excluded.

The committee would, therefore, after mature deliberation, present for your consideration the following rules regulating the Exhibition:

1st. The association invites manufacturers and others to exhibit at the annual meetings crude drugs, chemicals, pharmaceutical preparations, chemical and pharmaceutical apparatus and utensils, and such objects as possess a general scientific or special pharmaceutical interest.

2d. The following articles shall not be admitted to these exhibitions: Proprietary and patented medicines, medicinal or pharmaceutical preparations the names of which have been copyrighted or the complete working formula for which is withheld, and such chemical preparations or mixtures which are offered under other than their proper scientifically recognized names.

3d. The Committee on Exhibition, appointed under Chapter VIII, Article 2, Section 9, shall report during the meeting on the articles exhibited, with such comments as in their judgment may be deemed proper.

Your committee are of the opinion that the above would cover the ground well and exclude all such things that are not desirable.

We would also recommend that the above be included in the by-laws, and appended to Chapter VIII, as Article 5, Sections 1, 2, and 3.

George W. Kennedy,
Chairman Executive Committee.

The report was, on motion, accepted, and the consideration and adoption of the recommendations, which involve an amendment to the by-laws, were, under the rules, laid over to a subsequent session.

Mr. Menninger read the report of the Committee on Revision of the Pharmacopœia (see page 668), which was accepted and referred.

Mr. Menninger.—Mr. President: We have not a harder working pharmaceutist in the country than Mr. Rice. He has done an immense amount of labor during the past year, and I know from association with him that it has completely broken down his health. His pharmacopœial work has occupied a great portion of his time during the year. I move the acceptance of his resignation.

Mr. J. M. Maisch.—I second the motion; and in rising to second it I wish to add my testimony to what Dr. Menninger has said in regard to the labors of Mr. Rice. That the work on the Pharmacopœia has advanced as far as it has been presented, is mainly due to his exertions, and while he seems to be disposed in his report to give all the credit to the members of the committee, I will say for one, that very little of that credit is due to me, for I have been much occupied with other labors. It is principally due to that energy and wonderful talent of organizing possessed by Mr. Rice that it has reached its present advancement.

The resignation of Mr. Rice was accepted. (See minutes of sixth session.)

Agreeably to the suggestions of Mr. Rice the Business Committee moved the adoption of the following resolutions:

Resolved, That the thanks of the American Pharmaceutical Association are due and are hereby respectfully tendered to the Hon. William M. Evarts, LL.D., United States Secretary of State, for the interest he has manifested in the affairs of this Association, by causing a circular of inquiry from the Committee on the Revision of the United States Pharmacopœia to be forwarded to the United States Ministers and Consuls abroad.

Resolved, That the thanks of the Association be also tendered to the diplomatic officers of the United States who have replied to the circular, and whose replies have been of great service to the Association.

Resolved, That the thanks of the Association be tendered to all those gentlemen who have extended aid to the Committee on the Revision of the United States Pharmacopœia.

The resolutions were carried unanimously.

President Luhn occupied the chair and called for the reading of answers to queries, when Mr. Kennedy read an essay on Coca (see page 764), in answer to Query 1.

An essay on Erythroxylon Coca was also presented by Mr. J. G. Steele (see page 774), a synopsis of which, together with several interesting portions of the paper, was read by Mr. Scheffer. Both papers were accepted and referred.

MR. ROSE.—The fact of it being used by the Indians in connection with lime suggested to me the idea of using lime. I use a solution of saccharated lime and a hydro-alcoholic menstruum of equal parts of alcohol and water. I find the results very satisfactory. Having met two gentlemen who had been in the habit of using coca for some time, I gave each a sample of the kind made with the lime solution, and also that made with the alcohol of different strengths, and I found in each case that they were very much pleased with that in which the lime was used.

MR. KENNEDY.—In preparing a fluid extract of coca, I was very careful in selecting a fine article of the drug. The article which I obtained from Dr. Squibb had a very fine odor—finer than I ever noticed before. In making the preparation, I found that diluted alcohol did not hold the principles in solution, and that in a few days there was a precipitate. When the alcohol was increased to twelve ounces to the pint, I found that a perfect solution was obtained, not the slightest particle of sediment was noticeable, and the odor and taste resembled very much that of the leaf. It had that numbness and bitterness, and the preparation seemed a very excellent one. I never knew of its being prepared with lime. That may be a very excellent way to prepare it, but I am satisfied that anything less than twelve fluid ounces of alcohol to the pint will not keep the drug in solution.

MR. MAISCH.—Is the precipitate waxy matter?

MR. KENNEDY.—It may be the waxy matter.

MR. MAISCH.—I am not prepared to speak on the propriety of using an alkaline liquid, but will say that in South America coca is used together with the alkaline ash of chenopodium quinoa.

MR. KENNEDY.—The precipitate makes a very ugly appearance, and to be on the safe side, I thought it would be better to have a little more alcohol, as long as it preserved the fluid extract nicely. I have seen no commencement of precipitation in what I have had.

MR. SAUNDERS.—I have been preparing during the last year quite a number of extracts of coca, and I have not met with the difficulty Mr. Kennedy refers to. It might be the difference in the quality of the leaves that caused this difficulty. I have kept the fluid extract for some months without ever observing any signs of the sediment. I think Mr. Rose's method of using lime an excellent one.

Queries No. 2, on Dialyzed Iron, and No. 5, on the Affinity of Glycerin for Water, were continued for another year. In regard to the latter subject the following remarks were made:

MR. KENNEDY.—This query may take me some three or four years to answer completely. I commenced my experiments shortly after the last adjournment of the Association, and they are still progressing. I found that in wide-mouthed vessels the absorption of water takes place very rapidly, and is at present about completed; about sixty per cent. of water has been absorbed. But I am also experimenting with narrow-mouthed bottles, and these absorb very slowly.

Query 7, on the Value, etc., of Damiana, being called up, a verbal report was made as follows:

MR. MENNINGER.—While I have no written report, I wish to make a short statement. The medicinal value of damiana is not a settled question. The botanical origin of damiana seems to be well established, though there is a difference in nomenclature. There is a species of haplopappus erroneously called damiana. True damiana is undoubtedly a turnera, called aphrodisiaca, an unfortunate name,—hence it smacks much of quackery. It is frequently referred to in certain more or less decent or indecent circulars throughout the United States. I am satisfied from inquiries I have made through the hospitals of New York that there is very little therapeutic value in damiana. Various parties claiming to be manufacturers get certificates published, which show their authors to be fit subjects for the clergymen.

Mr. Murray.—I would like to ask Dr. Menninger if he remembers the name of the gentleman who named it aphrodisiaca.

Mr. Menninger.—It was named by Professor Ward, a botanist of the Agricultural Department at Washington. I have his description of the plant, which I obtained from the Agricultural Department. I sent it to Professor Gray. His description does not agree with Professor Gray's. It may be attributed to the mutilated condition in which the specimens appeared. These gentlemen may have had perfect specimens, but notwithstanding a correspondence with Central and South America, and visits paid to houses in New York in regard to the matter, I have been unable to obtain a perfect specimen of the plant.

Mr. Murray.—The reason I asked the question was that the names of new plants sometimes come from irresponsible parties. Professor Rothrock was on several exploring expeditions, and he condemned the name, and his remarks in regard to the persons who name those plants are not very complimentary. I have had a number of specimens mailed to me, but not a single specimen, though all were called botanical specimens, was worthy of the name. I have found a number of gentlemen who claimed to have had the flowers, and calling on them, I have found that they had haplopappus, but not good turnera.

Mr. Wellcome, who had accepted Query 8, being absent from the country, the subject of the Cultivation of Foreign Drugs Formerly Imported, was continued to him for another year.

Mr. Sheppard's answer to Query 9, on Compound Resin cerate, was read by Mr. Scheffer, and referred (see page 768). It was suggested that cold-pressed linseed oil, used in place of the ordinary linseed oil, might improve the cerate.

Query 10, referring to Deleterious Colors for Candies, received attention in a paper by Professor Sharples, which was read by Mr. Saunders, and referred (see page 796).

Mr. Menninger.—In connection with the candy question, I wish to relate a little incident which occurred to me a short time ago, on making the acquaintance of a gentleman in New York, who dealt largely in silicate of soda. He spoke of the large quantity of water-gloss that was sold. I expressed my astonishment at the large amount he mentioned, and inquired from what source the demand for it came. He said: "We sell it to the candymakers." I cannot tell why the candymakers use it, unless it is to give weight to the candy.

Mr. Sloan.—They use it to varnish the candy.

Mr. Menninger.—It is not pertinent to this query, but I will remark that large quantities of it are used also in toilet soaps.

The following queries were continued for another year: No. 11, on Tinctures, to Jacob Jesson; No. 12, on Mercurial Powder, with

Sugar of Milk, to Professor Bedford ; No. 13, on Ready Made Pills, to R. V. Mattison, and No. 16, on Emplastrum Thapsiæ, to H. P. Tarrant.

Mr. Tarrant.—I respectfully ask a continuation of that query. I have endeavored to the best of my ability to place myself in possession of the root, and have corresponded with several agents and parties in France, but I have been unable to obtain it. The only information I can get in regard to it from botanical works, is that it is referred to as Thapsia garganica. The parties manufacturing this plaster, as I understand, do not sell the root.

An interesting paper, by Dr. A. W. Miller, on the Certain Product of Benzoin Odoriferum, written in answer to Query 15, was read by Mr. Saunders; the volatile and fixed oils of the berries were exhibited and attracted much attention. The paper will be found on page 772.

Mr. Scheffer read a paper, by Mr. E. L. Boerner, on Colchicum Seed, in answer to Query 17, which was accepted and referred. (See page 760.)

Mr. Rose.—In this connection I must ask some one to inform me what the difference is between gasolin and petroleum benzin.

Mr. Menninger.—Gasolin and benzin are merely trade names. The two articles are substantially identical, both being among the first products of the distillation of coal oil.

Mr. Shinn.—Gasolin is much the lighter product, always coming over first in the distillation, and it is a grade above petroleum benzin. It is very volatile, and is used in place of illuminating gas.

Query 19, on an Improved Formula for Fluid Extract of Wild Cherry, being called up, several samples were shown and the following remarks made:

Mr. Shinn.—Mr Graham and myself, I am sorry to say, have been unable to come to a sufficiently satisfactory conclusion; to write a paper on the subject. We have both made experiments to that end, but we have not written anything on it. Before leaving home, Mr. Graham came to my place and brought with him a bottle of fluid extract of wild cherry which he thought satisfactory. This specimen is made of eight ounces of the bark to sixteen ounces of the result. I will state that he does not use, and neither of us is in favor of using, the menstruum suggested by the Pharmacopœia. Mr. Graham uses a menstruum of equal parts of syrup and water, with which he percolates the carefully powdered wild cherry bark so as to enable the hydrocyanic acid to develop. The residue is perfectly tasteless, and the extract has all the properties of the bark. This specimen he presents to us is made of a menstruum consisting of three parts of glycerin, three of syrup, and nine of water. You will see by examination that the result is very satisfactory. My own idea was to have used alcohol with glycerin and water, but my experiments are not sufficiently advanced to come to a satisfactory conclusion. This preparation has the advantage of mixing almost perfectly with water; there is a very slight opalescence when mixed with water, but a clear mixture will be obtained if syrup and water only are used. A small quantity of alcohol—as much as could be used in the menstruum without losing the virtues of the fluid extract—would be a very decided advantage. I think Mr. Graham's formula of using sugar and water is very satisfactory. The only question in his mind was whether the strength should be part to part, or one to two parts of the fluid extract. Either proportion would render it much stronger than most of the preparations now on the market.

Mr. Kennedy.—Does this fluid extract keep well?

Mr. Shinn.—It keeps all through the summer perfectly well. I do not know how long this sample has been kept, as there is a very great demand for his preparations.

The President.—I beg to state that only a week ago I read a paper on that subject before the Pharmaceutical Association of South Carolina. I think that I fully demonstrated that the bark could not be extracted pound to pound or a pound to sixteen fluid ounces. I used a proportion similar to Mr. Graham of glycerin and water, allowed the bark to macerate in a stone jar for four days, working it up every day, and then put it in the percolator, packing it as tightly as possible; if it can be pressed with a power, so much the better. The menstruum consists of pure water. A tube extends ten or twelve feet above the level of the percolator, and this pressure carries the macerating menstruum through very rapidly. As soon as sixteen ounces are percolated out of this bark, the water replaces the macerating menstruum in the percolator. It will have gained an ounce and a half of extractive matter to the pound. The extract is very fine. I showed a sample of it to Mr. Sheppard, of Boston, and he was very much pleased with it, and he begged me to write a paper on it for this Association; but as our State Association was young, and but few papers were volunteered, I thought I would read the paper before it.

Mr. Shinn.—Mr. Graham mixes some of the powdered bark with glycerin and sugar, and allows it to stand for over twenty-four hours, and on the addition of water the odor immediately came up. Did you notice, when it had been standing four days, that the hydrocyanic acid was developed?

Mr. President.—It was developed in about twenty-four hours.

Mr. Wood.—I think the experiments of these gentlemen show that glycerin and water would be far superior to the formula at present contained in the Pharmacopœia.

Mr. Kennedy.—I would like to know to what degree was the odor developed?

The President.—It was very strong indeed.

Mr. Menninger.—Mr. Shinn has anticipated me to some extent. The oil is not developed in glycerin, but in water. As to this system of using a pressure of water, I think it is erroneous. On reflection I think we will become convinced of this, that no menstruum can be poured on in the way referred to without mixing. These is no tendency in liquids of different densities to establish an equilibrium.

Mr. Lloyd.—I appreciate the remarks of Mr. Menninger, that liquids will mix. I have been carrying on some experiments for the last year myself in my laboratory, and I find that however heavy the lower liquid may be it will diffuse; and if there be a syrup or heavy liquid at the bottom, it will gradually diffuse until it reaches the top.

Mr. Menninger.—If you use a thin porous earthenware jar, the current will go through it, and the two fluids cannot be separated unless you put an inferior membrane between them.

The President.—I use a jar of a peculiar pattern. It will not admit of any greater amount than sixteen ounces to come out.

Mr. Shinn.—You get sufficiently near the sixteen ounces to retain sufficient glycerin as a preservative.

Mr. Lloyd.—I understood Mr. Menninger to say that water would be sufficient to get the extract. Does hydrocyanic acid alone give value to the wild cherry and are there no other principles to be extracted?

Mr. Maisch.—The question put by Mr. Lloyd is a very pertinent one. The nature of wild cherry bark is very insufficiently known. We do not know enough about the bitter principle; and it is usually considered that the liquid preparations of the wild cherry bark should contain with the hydrocyanic acid also the bitter principle and tannin. In regard to what Mr. Menninger says about the mixing of liquids, I think it is undoubtedly true; but it must be borne in mind that when a heavy liquid like a mixture of sugar and water, or glycerin and water, is covered over with a lighter liquid like water, and the lower liquid is allowed to drop from below, the diffusion of the two liquids is very light.. It is very different with water put on a liquid like diluted alcohol. The heavy water will descend, and the mixing will be much more rapid.

Mr. Lloyd.—Upon this subject I appreciate Mr. Maisch's remarks. I made a concentrated solution of chloride of sodium, and colored a part with cochineal, and endeavoring to make it remain on top I found it was impossible. When I put the uncolored upon the colored part it diffused gradually, until there was an even mixture of the two.

Credentials from the St. Louis College of Pharmacy, accrediting Mr. Robert S. Drake as a delegate, were read, and, on motion, the gentleman was admitted.

Mr. Menninger.—I rise to the performance of a sad duty, in announcing to the Association the departure from among us, during the past year, of a gentleman well known to the chemists and pharmacists of the world. Though not a member of this Association, he was a man who was illustrious among the chemists and pharmacists of this country. I allude to the death of Thomas

H. Powers, of Philadelphia, and I ask the appointment of a committee of three to draft resolutions expressive of the feelings of this Association relative to that sad event.

The motion to appoint a committee for the purpose stated was seconded and adopted, and the chair selected Messrs. Menninger, of New York, Ingalls, of Georgia, and Drake, of Missouri, to attend to the duty indicated in the resolution.

A letter from Messrs. Wallace Bros., of Statesville, N. C., was read, inviting the members to visit that town. The invitation was accepted with thanks, and directed to be acknowledged.

Mr. Saunders.—I had a visit from Mr. Wallace a few weeks ago, and he stated that he would be most happy to meet any members of the Association who might visit his place, and to show them the scenery and the sources from which medicinal products can be obtained. His residence is at Statesville, about twenty-five miles distant from Charlotte, one of the stations on the Piedmont Air Line Railway.

It was stated that the following day would be Thanksgiving Day, and the question arose whether any sessions should be held on that day.

Mr. Menninger.—I would be the last to make any objection to the observance of the national day of thanksgiving, but as our labors are those of the Good Samaritan, and our profession one of a similar character, I think there is no sin in holding our thanksgiving devotions early and late in our own chambers, and attending to our labors of brotherly love, as members of this Association, throughout the day

A motion was then made and adopted, that regular sessions should be held on Thursday, and the Association subsequently adjourned until half-past nine o'clock the next morning.

Fourth Session.—Thursday Morning, November 28th.

The meeting was called to order by President Luhn. The minutes of the third session were read by the Secretary, and, on motion, approved.

A letter from Mr. William J. Land, State Chemist, tendering to the members an invitation to visit his laboratory, was read, and the invitation accepted with thanks.

Invitations were received from the pharmacists and druggists of Portland, Me., Indianapolis, Ind., and Cincinnati, Ohio, for holding the next annual meeting at the cities named. They were, on motion, referred to a committee of three, to be appointed by the chair, said committee to consider and report on the time and place of the next meeting. The President appointed Messrs. Eastman, of New Hampshire, Tarrant, of Georgia, and Tomfohede, of Missouri, to attend to this duty.

Dr. Murray offered the following preamble and resolution:

Continuing the praiseworthy action of the meeting of 1876, in approving the gradual introduction of that marvel of accuracy, uniformity, simplicity, unity, and economy—the metrical or decimal system of weights and measures, I beg your careful consideration of the following, as a means of simplifying its popular introduction:

Resolved, That the Permanent Secretary of the American Pharmaceutical Association be authorized, over the signature of the President, to address a memorial to the Honorables, the President of the Senate, and the Speaker of the House of Representatives of the United States, praying their respective honorable bodies to authorize Colonel Albert J. Meyer, Chief of the Signal Service, to add another column to the meteorological table usually published in the newspapers, which shall represent the temperature according to the Centigrade scale; this to accustom the people to doing more of their numerical thinking in decimals, as an auxiliary to the metric system, and looking to the ultimate general adoption of the Centigrade scale only.

MR. MURRAY.—This, I think, most of the members will appreciate, since the foreign journals largely use the Centigrade scale, and many of our teachers have given it the preference. I think this mode can be easily practiced. It seems to me that it would be brought into use if the attention of the authorities was called to it, and I think this Association would be the proper one to act, since we are so largely interested in the thermometer.

MR. MENNINGER.—If I remember correctly, a committee of this Association has had a similar matter in charge, and similar memorials have been presented to Congress by some of our colleges, and the effort proved a signal failure. For my part, I doubt the propriety of taking any action now. Mr. Meyer, and several of the heads of the departments of our Government, are earnest advocates of the decimal system, but I doubt the practicability of publishing the reports at present in the Centigrade scale. The newspapers, which publish the reports gratuitously, would, no doubt, object to publishing a comparative scale, as it would be more trouble and expense. I would suggest, however, that the resolution be referred to one of the standing committees of the Association, and they can take some action on it. I move that it be referred to the Executive Committee to report thereon at their convenience.

MR. MURRAY.—Before that is done, I wish to make a correction. The Fahrenheit scale is not to be abolished; it is simply meant that another column, containing the Centigrade scale, be placed alongside the Fahrenheit scale. It is invaluable, and why should not the American Pharmaceutical Association place itself on record on the right side?

Mr. Maisch.—It is well known that the Association has had that subject before it since 1875, and some of our most valuable members can not see their way clear. As much as I am in favor of the use of the metric system, I cannot see how this Association can act upon the proposition now. We have had a committee to which was referred the whole subject of the metric system, for the last two years, and it has been unable to come to any conclusion. I would object to any resolution being passed without its having had the very careful consideration of the committee, and I would vote against its being referred to a new committee, and likewise against the adoption of a favorable report of such a committee—not because I am opposed to it, but because I cannot see my way clear in uniting the various views held by different members of the Association.

Mr. Kennedy.—I think the resolution had better be withdrawn. The time would be too short for a committee to report on it at this meeting, and to have a committee appointed to report at the next meeting, would result as it has done before. So I think we had better pass it over.

Mr. Murray.—I don't feel like withdrawing it, but I accept Dr. Menninger's resolution to refer it to the Executive Committee.

The resolution, with the amendment to refer it to the Executive Committee for report at their convenience, was then adopted and the same course was followed with the following resolution, likewise offered by Dr. Murray:

Resolved, That a memorial, with a similar preamble, be similarly prepared and addressed, praying that authority be given Dr. Henry R. Linderman, Director of the Mints, to stamp the different gold, silver, nickel, and copper coin with their respective weights in *grams* (gm.) and *centigrams* (cg.) of the metric system, as a ready and laudable means of familiarizing the masses with said system, and looking to its early general adoption.

Resolved also, That a copy of these resolutions be sent to the Hon. Secretary of War, to Colonel Albert J. Meyer, to the Hon. Secretary of the Treasury, and to Dr. Henry R. Linderman, respectively.

Mr. Menninger asked to be relieved from serving on the Committee on the Powers' Obituary, since his time was occupied by the duties as chairman of the Business Committee. The request was granted, and Mr. J. L. Lemberger, of Pennsylvania, was appointed in his place.

The Business Committee brought forward the report of the Committee on Ways and Means, which was read and laid upon the table for future action.

To the American Pharmaceutical Association.

Gentlemen: Your committee, appointed at the session of 1877, one of Ways and Means to devise a plan whereby the revenue of the Association may be increased to a sum sufficient to meet its growing requirements, and to whom was also referred the matter of altering Chapter VI, Article IV, of the By-laws, by adding thereto the words "excepting life members under the Constitution, who shall be furnished with a copy of the Proceedings upon the payment of $3 annually," respectfully report: The necessity of immediate action is urgent in face of the fact that the income of the Association becomes each year more deficient in meeting, as they accrue, the various demands made upon it, and that the future, being continuously mortgaged, promises no relief, if we desire the Association to maintain its elevated position of usefulness to the profession represented by it.

Your committee has expended much thought in order to evolve a plan likely to give general satisfaction, and while presenting the conclusions arrived at, unanimously urge upon the membership a cordial support of such resolutions as are offered, in view of the importance and necessity of the case.

Several propositions have been considered as expressing the recorded or drifting desires of members.

First. As in the early days of the Association, members acquired the right to life membership and its privileges without the payment of further dues, it is found that through the increased usefulness of the Association, a larger volume of Proceedings requires to be issued, the effort to do which contributes to the financial embarrassment of the same. And since when life membership was instituted, it was not in expectation to issue so compendious or expensive a work, we should decline to furnish the Proceedings to this class of members, but continue to them all of the other privileges of membership. The Secretary of the Association in his late annual report, without recommending any particular action, referred to the loss of volumes of Proceedings through changes occurring in the residence of life members, of which he had received no notification.

The second plan offered, is that of furnishing the non-paying members with an annual report, curtailed in many of its parts, with the intent of lessening the expense of publication.

Thirdly, and this involves the proposed alteration of a By-law, to call upon old life members who are receiving benefits, probably greater than they ever contemplated, to contribute a portion of the cost of the Reports furnished them, and withhold the same until they do so contribute. To many this plan seems but just for the reasons before stated, such contribution being ratable to the benefit enjoyed.

The committee believe an abridgment of the volume of Proceedings as suggested by the second proposition, to be an economy so trifling as of no practical account, and make answer, that in their opinion it would be dishonorable as well as illegal to break faith with those who became life members under the old Constitution. Having made a disadvantageous bargain it must be adhered to and the burden carried. A life member is *a member for life* and cannot be dropped from the rolls, neither can his rights be abrogated. All of the foregoing propositions should therefore be dismissed.

A resolution appropriate to the disposition of the Proceedings in the cases noted by the Secretary is appended.

Fourth. To reduce as far as practicable the size of the printed volume by using smaller type, by condensing all reports, by rigorously cutting out all "useless" matter, and by printing all parts of the volume "solid" instead of "leaded." Your committee would be loath to have the membership decide upon such a course. To their minds the volume of Proceedings as annually presented is in its arrangement, completeness, and convenience a most valuable compend of pharmaceutical lore, in general, scientific, and literary interest, too valuable to be measured by the mere cost of its production or the pecuniary sacrifice necessary to obtain it.

Fifth. To establish a graded fee for life membership. This suggestion has upon consultation met with general approval. The present rule of making a specific sum apply to all, regardless of the length of time they have been connected with the Association, is unequal in its bearing and unusual with bodies extending the privilege oi life membership. As the funds received from this source are to be securely invested, the interest only thereof to be applied to the uses of the Association, your committee in offering a graded scale, holds forth an inducement within the reach of the membership with but few exceptions to contribute largely to the permanent benefit of the Association, while insuring their future connection therewith against all contingencies. The volume of Proceedings must ever bear value to those allied with pharmacy and kindred sciences, whether active in professional duties, on the retired list, or engaged in other pursuits.

Sixth. A per capita tax. As time must necessarily elapse before the advantages to accrue from the establishment of a permanent fund can become operative to a degree sufficient to relieve the Association from the pressure of insufficient income, your committee believe there may properly be levied upon the membership, to be charged and collected annually if necessary, a small contribution to meet the estimated deficiencies of the fiscal year next ensuing. This amount can be determined upon the recommendation of the Auditing Committee appointed at each session. Therefore,

Resolved, That Article V, Chapter VII, of the By-laws be amended to read: Any member not in arrears to the Association, who shall pay to the Treasurer the sum of $75 during the first year of his connection therewith, or after five years $70, or after ten years $60, or after fifteen years $50, or after twenty years $40, shall become a life member and shall be exempt from all future annual contributions.

Resolved, That at each annual session the Auditing Committee shall, if necessary, determine a per capita tax to cover estimated deficiencies for the fiscal year, to be levied and collected with the yearly contribution.

Resolved, That the Secretary shall notify life members of the publication of each year's Proceedings, and furnish the same to such upon their subsequent application.

CHARLES L. EBERLE,
EDM. GREGORY,
WILLIAM H. ROGERS,
Committee.

The Business Committee called up the amendment to the By-laws, proposed by the Executive Committee in its report on the annual Exhibitions (see page 879). The amendment was again read, and it was moved and carried unanimously that it be incorporated in the By-laws as Chapter VIII, Article V, Sections 1, 2, and 3.

A paper on Extractum Glycyrrhizæ Fluidum, as a report on Query 18, by Prof. Remington (see page 756), was read by Mr. Saunders and referred. Ten different samples of the fluid extract were exhibited in connection with the paper.

Mr. Kennedy.—Some of the preparations have a very strong odor of ammonia. It seems to me too much so.

Mr. Lloyd.—I have made a considerable amount of fluid extract of liquorice. Last year in the paper I presented I did not speak of this fluid extract. I then used a menstruum composed almost entirely of water. I used no glycerin. Just enough of alcohol was added to preserve the extract.

Mr. Menninger.—How does Mr. Lloyd expect to keep glycyrrhizin in solution?

Mr. Maisch.—It has been proven by Roussin that glycyrrhizin as it exists in liquorice root is soluble in water; but in the extract of liquorice a great portion of the principle is insoluble in water and requires the addition of an alkali to dissolve it. It has also been proven that when heat is applied some ammonia is given off, and a corresponding quantity of glycyrrhizin becomes insoluble. I think when heat is applied a little ammonia is required to keep all the glycyrrhizin in solution.

Mr. Lloyd.—When I wish to prepare eighty pounds of fluid extract I use one hundred pounds of the root and the first eighty pounds of percolate as the fluid extract. I find that it will represent very well the liquorice itself and give satisfaction in the hands of physicians. I use one part of alcohol and three parts of water as my menstruum. I can perceive very little disagreeable taste; very little unpleasant after-taste. It is slightly opalescent. By standing it will form a very slight sediment. If the alcohol is increased there is a large amount of resinous substance taken from the liquorice root, which goes to the bottom. The aqueous liquid does not take it from the root.

Query 20 being called up, the Secretary stated that Mr. Stein had taken steps to prepare an answer on Commercial Oil of Cedar, but owing to changes in business had doubtless been prevented from finishing his investigations. The query was continued for another year. Likewise Queries No. 21, on Solvents for Wax, etc., to Prof. Bedford; No. 23, on Salicin, to Mr. Gregory; No. 24, on the Use of Grape Sugar, to Mr. Sargent; and No. 25, on Percolation, to Mr. Lloyd. Mr. Lloyd's numerous notes on the subject had been destroyed by fire.

Mr. Lloyd read a paper on Berberina and its Salts (see page 800), in answer to Query 26.

Mr. Menninger.—As Mr. Lloyd did not do so, I beg leave to call attention to his preparations illustrative of the paper in the Exhibition part of the hall. It is a very interesting collection.

Mr. Maisch.—I dislike to see a paper like that go by without having some discussion on it; but I must confess that the paper is so exhaustive that I do not know how to say anything about it, either in addition or otherwise. The trouble Mr. Lloyd has gone to in preparing that paper has been so great, and he has given us so much information that cannot be found in books, that I consider it one of the most important papers presented to the Association.

Mr. Lloyd.—There are a great many points in the paper which I would like to have explained to myself, because I do not plainly understand them, and I would like to hear the views of other members of the Association. One of these points is the relation of the white alkaloid of hydrastis to berberina. We find a white alkaloid in nearly all the roots in which berberina is found. What relation does this bear to berberina?

Mr. Maisch.—That is certainly a most difficult question to answer, inasmuch as the white principles are of different composition in different roots. Thus, for instance, it has been shown that the berberina, as it exists in calumba root, bears a certain relation to columbin, and that the elements of ammonia added to the latter may probably result in the formation of berberina and columbic acid. Beyond this we know nothing. It seems to me, from the experiments I have made in endeavoring to obtain berberina from various roots in which it exists, that it is undoubtedly combined with some acid; but what acid it is, I am not prepared to say. From various investigations it is evident that there is a difference between the various white alkaloids and hydrastia. Such differences have been pointed out by Durand, Mayer, Gross, and others.

Mr. Lloyd.—I will say that there is one acid in hydrastis which I did not name. This acid forms soluble salts with lime and may be obtained from the refuse material after separating the salts, though I have never obtained it pure, as it was of no interest to me; but if any gentlemen of this association desire to experiment further, I will furnish them with the refuse liquor, after separating the berberina from the tincture of hydrastis.

Mr. Maisch.—I very gladly accept the offer of Mr. Lloyd for a member of the Association, who I think will further investigate the subject.

Mr. Shinn.—It would be interesting to the members of the Association to know where this berberina is used. In my neighborhood a drachm would be enough to supply all demands for a year.

Mr. Lloyd.—It is sometimes shipped to Mexico, sometimes to San Francisco. It is used in every State in the Union, though in small amounts.

Mr. Shinn.—For what purpose is it used?

Mr. Lloyd.—It is principally used as a bitter tonic. When it comes to therapeutical uses, however, I am not very well informed.

A Member.—It is used as a tonic and stomachic.

Mr. Maisch.—From what has been said by Mr. Lloyd, it is evidently prepared in large quantities. When Mr. Lloyd, a year ago, sent me some crystals of hydrastia, it was evident that they had been obtained from a large amount of the mother liquid, and I supposed could not be obtained from ordinary amounts of hydrastis.

Mr. Shinn.—Perhaps it is used by the eclectics?

Mr. Lloyd.—I think the largest amount of it is used by the eclectics, though I received during the last year several orders from Philadelphia. These experiments in hydrastis are very interesting to me. I reasoned that berberina, being soluble in alkaline liquids, would be obtained in solution by percolating the root with ammonia and water. Accordingly I placed in a percolator a hundred pounds of hydrastis, partially moistened with a mixture of four parts of ammonia to ninety-six parts of water, and continued the percolation with the same menstruum. Then I added sulphuric acid to the percolate, and I could get no precipitate. I added muriatic acid, and could get no precipitate; and out of that hundred pounds I did not get one ounce of berberina. The berberina had been destroyed. I never repeated the experiment. It did not pay. (Laughter.)

Mr. Kennedy.—I will state that six or seven years ago a travelling physician stopped in my town who used it, apparently with good success, in connection with columba and xanthoxylon. He had a number of people flocking to him from the country. They looked upon it as a wonderful cure for dyspepsia. I have also met with another physician since that time who used it.

Mr. Saunders.—In Canada physicians use to a considerable extent the muriate of berberina. Some of our regular physicians use it often.

Mr. Menninger.—What is its therapeutic action?

Mr. Saunders.—It is used as a tonic. I think it is specially applicable to certain cases, but I cannot explain the nature of the cases.

Mr. Menninger.—What is the dose usually administered?

Mr. Saunders.—I have frequently dispensed it in quantities of from one to two scruples, and sometimes from one to twenty powders.

Mr. Kennedy.—The physician I had reference to prescribed from half a scruple to a scruple, in a pint and a half mixture, to be taken in tablespoonful doses three times a day.

Mr. Lloyd.—Muriate of hydrastia and muriate of berberina are the same thing. It was discovered by William S. Merrell in hydrastis canadensis, and he thought it was an alkaloid peculiar to that root. It has not yet got rid of that name hydrastia. In a few years I think the word "hydrastia" will be altogether dropped and berberina adopted.

Mr. Menninger.—Although this paper is one of the most interesting presented to us for some years past, the practical application of berberina is very difficult to ascertain. Of course so far as the action of the travelling doctor (save the mark!) is concerned in using it for dyspepsia, physicians know that dyspepsia is a symptom, and everything is good for dyspepsia.

MR. KENNEDY.—How about sauerkraut?

MR. MENNINGER.—Sauerkraut, by the way, is undoubtedly one of the best correctives for dyspepsia. (Laughter.) And it has been known to produce much of the good health of our Pennsylvania delegates. (Applause and laughter.)

MR. MAISCH.—Berberina has been used also as an injection in gonorrhœa.

MR. MENNINGER.—Yes; I know that. (Laughter.)

MR. SLOAN.—I was just going to state that it is used as a specific in the treatment of diseases of the mucous membrane and diseases of the stomach. It is used more largely by the eclectic school than the regular school of physicians. Some of the more soluble salts are used by the regular school.

MR. MENNINGER.—Whether berberina takes the place of hydrastis canadensis is entirely another question.

MR. LLOYD.—Berberina is used as an injection, but what its effects are, I do not know. I only know that I have renewed orders for large amounts of it and have had to make it up.

The Committee on the Time and Place of the Next Annual Meeting presented a report, recommending that the twenty-seventh annual meeting be held in the city of Indianapolis, and suggesting that it take place on the second Tuesday of June.

MR. SHINN.—It is probable that the committee had some special object in recommending this unusual time of meeting. Some may find it easy to get away in June, but others will find it their busiest season. I hope the committee will enlighten us as to the advantages of meeting in June in preference to September.

MR. ROSS.—I would like to ask when the meeting of the Pennsylvania Pharmaceutical Association takes place; is it not on the 10th of June?

MR. MAISCH.—I think it is on the same day.

MR. EASTMAN.—Several of the delegates expressed a desire that some change might be made in the time of meeting, and, on consultation with some of the Western delegates, they expressed themselves in favor of June as much preferable to the usual time of meeting, and they believed that the meeting would be much better attended. The committee have merely made that suggestion, and it is for the meeting to decide.

MR. SHINN.—I think that June is the most unpropitious part of the year for the meetings of the Association. We generally combine pleasure with our meetings, and the fall, I think, is the best time generally from every point of view. It will be found the most convenient part of the year.

MR. MENNINGER.—I think it is undesirable to change the usual time of meeting. The attendance next year will largely be from Western members, and those residing in large cities. June is generally a bad month, and I think it will be hot in Indianapolis, as Mr. Sloan can testify. If there is any change to be made in the time of meeting, it would be better to defer it until the following year, when we propose to go South again; and would move as an amendment, that the meeting be held at the usual time, in September.

Mr. Maisch.—Would it not be better to divide the question into two parts; first, considering the place, and then the time?

Mr. Sloan.—So far as the temperature is concerned, we find it fully as hot in the month of September, generally, as in June. We are sometimes troubled with malarial fevers in September, and, in addition to that, it is not as easy for many of the members to leave their business in September.

The President.—I think myself that it is better to wait until this matter is fully considered before we determine to change the time of meeting. We have been meeting at one time for twenty-seven years, and it seems to be a little out of place to change it at this time. We have already shortened the business year by the postponement of this meeting, and this change would make it much shorter still.

Mr. Saunders.—I think it will not suit the majority of the members to change the time of meeting. One objection is the intensity of the heat at that time. I think, too, that if the meeting is held in June the attendance will not be as large, and, as the President has just stated, the time between the meetings will be very short. It will not suit as well, in my opinion, in June as in September.

Mr. Lloyd.—There is another point to be considered also. Many have accepted queries, and in case the meeting is held in June, they will have a very short time to prepare reports on them.

The Business Committee moved that the report be adopted as far as it relates to the *place* of the next meeting, and the resolution was adopted unanimously.

Mr. Menninger.—I now move that the time of meeting be the second Tuesday in September. I am actuated by the reasons already stated, and by the fact that most who regularly attend our meetings make their arrangements before the fall of the year in advance. We have very little time at our disposal; we are more the slaves of business than any other class in the community. We had best select some time when we can take our wives or families with us, and, as Mr. Shinn has remarked, combine business with pleasure.

A Member.—Is it not dangerous to visit that place in September. I understand that it is a malarial climate—a chill and fever country.

Mr. Sloan.—I beg to say to the gentleman that there is not a healthier city on this continent. There are places in that section of the country where malarial fevers prevail, but not in an aggravated form. September is the most pleasant season of the whole year, and everything is as favorable as in June.

Mr. Shinn.—I second the motion of Mr. Menninger, and suggest that September is much pleasanter than June for the meeting. September, while the mercury may be almost as high as in June, is decidedly a pleasant month. Whether it will suit the convenience of members to attend is another question. A gentleman has stated that members from the West can get off better in June than September, and that should be taken into consideration.

Mr. Scheffer.—I cannot judge much of the climate of Indianapolis, but I do not think that it differs much from that of Louisville. From a residence of twenty-eight years in Louisville, I will say that June is far more agreeable than September. In June we have never had the thermometer higher than ninety in the daytime; in September, we have had nights when it never went below ninety-two; the hottest part of the summer is sometimes in the first or second week of September. I think June would be a much more preferable month; still, it is perhaps better to hold the next meeting in September, and, after that, to change the meetings to the spring.

Mr. Land.—I did not intend to say anything on this question. When it came up I was in favor of June; I agreed with the committtee. Upon further consideration, I think it will only give us a few months at the outside to prepare for the next meeting, and I think, under all the circumstances, that we cannot, in justice to ourselves—in justice to those who are present and those who are absent—make any change in the time of meeting. I think it will do the Association infinite harm to hold this meeting in June. I did not at first consider the lateness of the present meeting.

Mr. Maisch.—If the meeting be held in June the ensuing year will only be six months.

The question was put on the motion, that the next meeting be held on the second Tuesday of September, and a division being called for, it was announced that twenty-three members had voted in the affirmative and thirteen in the negative. The motion was therefore declared carried.

Vice-President Rose occupied the chair.

Mr. Lloyd read a paper on Resin of Podophyllum in answer to Query 27 (see page 767), and illustrated the subject by placing upon the table a number of samples of the resin.

Mr. Maisch.—I desire to call the attention of the meeting to the color of the resin of podophyllum which Mr. Lloyd has placed on the table. It is much lighter than that usually prepared by apothecaries and met with in commerce. We generally find it brown, and without the light color it ought to have when precipitated with cold water.

Mr. Lloyd —If precipitated in the summer-time even though we use cold water, the resin will run together and form a mass, which will render it an inferior article.

Mr. Shinn.—It might be interesting to the members to know whether there are adulterated preparations of podophyllum in commerce, which may account for the difference in color.

Mr. Lloyd.—I am not prepared to speak on that. I think if the resin was adulterated, powdered podophyllum root would be used, which would have a tendency to give it a lighter and not a darker color.

A Concentrated Liquid Preparation of Lactucarium was the subject of a paper by Mr. Lemberger, in answer to Query 29. The author exhibited the crude material, and several samples of the preparation, and of the caoutchouc-like matter separated from the lactucarium (see page 762).

Mr. Lemberger. (Exhibiting samples.)—This fluid was made with the addition of glycerin to overcome the turbidity. This sample was made with the German lactucarium, and the other sample from English lactucarium. The large amount of caoutchouc found in this lactucarium is remarkable, and I have pretty well satisfied myself that it is caoutchouc from its solubility. I think, if it is deemed best by the Association, that this query might be continued. I have no desire to work any more in the matter, but perhaps the facts mentioned may bring out some better mind and lead to the discovery of some better process.

Mr. Shinn.—Mr. Lemberger percolates with diluted alcohol, and reserves four fluid ounces of the percolate; the balance of the percolate, ten fluid ounces, are mixed with the reserved four, and the result is sixteen troy ounces. I wish to know whether you have to add anything to make up the other two ounces.

Mr. Lemberger.—Diluted alcohol is added. The formula was purposely made to add a little alcohol to rinse out the filter. As I remarked, the formula might be improved very much; I do not know whether the efficiency could be increased, but the elegance might be considerably improved.

Mr. Shinn.—Mr. Lemberger may remember that a somewhat similar experiment was made many years ago by Mr. Hodgson, of Philadelphia.

Mr. Lemberger.—I examined the paper after I commenced my operations, and was much surprised to find that such a great man as Mr. Hodgson and such a little man as Lemberger should have entered the same channel.

Mr. Maisch.—This matter which Mr. Lemberger called caoutchouc, I think is mostly lactucerin, a kind of waxy substance contained in lactucarium, which has no taste at all, dissolves in hot alcohol, and crystallizes from it on cooling. It is soluble in ether, chloroform, and various other solvents which I do not now remember.

Mr. Lemberger.—I dissolved some in alcohol, and looked for crystals on the evaporation, but I failed to find them. In this deposit (referring to the samples) there is only a minute quantity of the bitter principle. This is a deposit which separates on the filtering of the percolate. I would be very glad, with the assistance of Prof. Maisch, Mr. Shinn, or any other gentleman of the Association, to make this query come up to what the Association desired in propounding it.

MR. MAISCH.—The main point was successfully answered by Mr. Lemberger, namely, to find a process by which the syrup could be made transparent without destroying the bitter principle. This is destroyed by the use of alkalies and alkaline salts; but by this process no alteration is effected.

MR. LEMBERGER.—I would like to have a sharp criticism on this subject. If you will allow me a minute or two, Mr. President, I wish to speak of an extract of opium which I think may be of sufficient importance to occupy some of the time of the Association. I take opium four troy ounces, benzin eight fluid ounces, macerate for forty-eight hours, and mix it in an iron mortar with an equal bulk of sand. I then place the opium on the slab, so as to dry it thoroughly until all the benzin odor has been dissipated. It is then percolated with warm water, at a temperature of about one hundred degrees, until exhausted. The opium yields very kindly to this treatment, and you are not troubled with the unpleasant resinous principle so annoying in making the ordinary extract.

MR. SAUNDERS.—Was the benzin percolated and the soluble matter tested?

MR. LEMBERGER.—I had the benzin exposed in the open air where I was evaporating it, and somebody in passing with a wheelbarrow knocked the capsule off.

MR. SHINN.—I would like to ask the gentlemen present if it is customary when the French syrup of lactucarium is prescribed, to furnish the French article or syrup of their own preparation. In our little village there are quite a number of physicians who designate Aubergier's. I feel pretty sure that there are some prominent druggists who use their own preparations. Aubergier's syrup, from France, has such a slight bitterness, if that is a test, that it cannot be compared with lactucarium.

MR. CANDIDUS.—Aubergier's syrup is very much weaker than the officinal, and if you leave the stopper out of the bottle, it will not ferment.

MR. SHINN.—I have noticed that Aubergier's syrup will decidedly ferment if the bottle is once opened and the cork put back again.

MR. LEMBERGER.—The syrup will keep for six or eight months perfectly well.

The following queries were continued for another year: No. 31, on the Preservative Properties of Boracic, Benzoic, and Salicylic Acids, to S. P. Sharples; No. 34, on the Value of Benzoin and Storax for Preserving Ointments, to I. J. Grahame; and No. 39, on the Preservation of Syrup of Iodide of Iron, to P. W. Bedford.

Query 38, on the Cause of the Deposition occurring in Syrup of Pyrophosphate of Iron, being called up, the following discussion took place:

MR. WOOD.—I prepared the syrup of pyrophosphate of iron according to the Pharmacopœia, and I have never met with any trouble.

Mr. Lloyd.—It is very essential that the syrup, or any solution of pyrophosphate of iron, had best be kept away from the sunlight, for it will cause a change of color.

Mr. Menninger.—There is no doubt about the change of color, but what is the chemical action and the cause of the change?

A Member.—So far as my experience goes it is due to the alkali.

Mr. Rose.—In the preparation of syrup of iron, quinine, and strychnine, I think it is due to the other acid. I think, if a sufficient quantity of phosphoric acid is used to keep the iron in solution, the syrup remains perfectly white.

Mr. Kuhn.—Does anybody know what is the cause of pyrophosphate of iron gelatinizing?

Mr. Maisch.—Is it not the loss of ammonia that occasions it?

Mr. Sloan.—A little ammonia will restore it.

Mr. Maisch.—Then, certainly, it is the loss of ammonia that causes the trouble.

The Effect of Alum in Preparing Resin of Podophyllum was the subject of Query 41, on which no report has been received.

Mr. Maisch.—That query is partly answered in Mr. Lloyd's paper. I do not remember whether he discussed this subject in particular; but it is well known it is a combination of the acid resin with aluminum which causes the yellow color. Whether the compound has any therapeutic value I cannot say.

Mr. Lloyd.—I have received numerous complaints from physicians, when the resin had been precipitated with lime-water, asking why the colored resin is griping. It may result from the presence of the lime.

Mr. Lloyd read a report on Query 43, referring to the Use of Fresh Plants in Preparing Tinctures (see page 755).

Mr. Rose.—Was there any difference in the time of collecting the green plant which affected or interfered with its success?

Mr. Lloyd.—It was collected in the fall. I never allowed the plant to be collected for any use until it reached maturity, unless it had reached its prime, and the watery substance found in the spring and summer roots had escaped.

Mr. Rose.—What complaint did the physicians have to make? Was it on account of the color, or the effect?

Mr. Lloyd.—They said it had no effect whatever. I have a half gallon bottle of it at the back of the room. I hope it will not be carried away and used.

Mr. Maisch.—Norwood's tincture of veratrum viride is professed to be made from the fresh roots of veratrum viride. It was at one time very celebrated. The water contained in fresh roots decreases the strength of the alcohol and interferes with its solvent powers.

Mr. Lloyd.—He does not state on the label that the fresh root is used, but the freshly gathered root. You will observe that the odor of the green veratrum differs much from Mr. Norwood's. It has an aromatic odor.

Mr. Land.—I will say, with regard to Norwood's, that I came from the same county he came from and know how he makes it. He used dry roots and strong alcohol. No water was used.

A Member.—I find strong alcohol the best menstruum I can use. It will make a fluid extract which will have the effect of dry veratrum. It will not have the dark color you get with water, but it will represent the activity of the root.

Mr. Maisch.—It seems germane to the subject discussed by Mr. Lloyd, to state that Mr. Ingalls has noticed that fluid extract of stillingia has become quite gelatinous. (The specimen was here shown.)

Mr. Ingalls.—That came from a half-gallon bottle, and was made by a very reputable house in this country. Last July I wrote to the manufacturers, but they could give no proper solution. I thought I might be able to obtain some light on the subject.

Mr. Scheffer.—There is a paper here to be offered, and after it is disposed of, this discussion will come in more properly perhaps.

Some discussion was had on Guarana, when Query 45 was called up.

Mr. Rose.—I have made some fluid preparations of guarana, and after having submitted them to physicians, have found that alcohol is the only menstruum for extracting it properly.

Mr. Mohr —I have found that strong alcohol is the only good solvent for extracting it. Any alcohol of less strength would give more or less precipitate.

A Member.—Isn't the active principle insoluble in water?

Mr. Rose.—That is a question I cannot answer, not having sufficient experience, but I would be very glad to see it solved.

Mr. Kennedy.—I have had it tested to my satisfaction that a preparation containing fifty per cent. alcohol had very good effects. I forget the amount of guarana used. A gentleman came to my place and got a half-ounce bottle of it for trial. The next day he returned and liked it so well that he got a larger quantity of it. The elixir made by me contained about fifty per cent. of alcohol. When given to persons with headache it has very good results.

Mr. Scheffer read a paper on the Alkaloids of Cinchona (see page 826), written by Prof. Sharples, in answer to Query 48.

Mr. Maisch.—I don't entirely agree with Prof. Sharples on this subject, and I am sorry he is not here. He agrees that De Vrij's process is correct in all cases where the quinia is in excess and the other alkaloids are present in small proportions only. I am astonished to learn that he can only get about seven per cent. of mixed alkaloids from a mixture containing thirty per cent. of quinia, quinidia, cinchonidia, and seventy per cent. of cinchonia; since not one of the four cinchonal alkaloids is insoluble in ether. Cinchonia is only slightly soluble in ether; but quinia is freely soluble in a small quantity. A student (Mr. Wells) examined into a similar subject, under my supervision, some years ago, and he did what Mr. Sharples recommended. He tried to find out how much alkaloid he could get from the mixture of large quantities of sulphate of cinchonia with small quantities of the sulphates of other cinchona alkaloids. The results came out, not absolutely, but approximately correct. He found it necessary to modify De Vrij's process, not for the reason that too little, but that too large, a quantity had been obtained of what should have been quinia only, because cinchonia and other alkaloids dissolved to some extent at the same time that the quinia was extracted by ether used in the same quantity as directed by De Vrij. On evaporating the ether a considerable quantity of cinchonia was found in the residue, and on treating that with sixty times the quantity of ether, Mr. Wells found that mainly quinia and quinidia were dissolved, and a residue was left which was apparently insoluble in ether and did not respond to the test with chlorine water and ammonia. The difficulty of absolutely separating the cinchona alkaloids from one another is very great and it has not been overcome yet. The most that De Vrij, Howard, Hesse, and others who are authorities on that question pretend to give, are the approximate results in separating the alkaloids.

Mr. Menninger.—I saw it stated that the solubility of quinia and cinchonidia are both increased in water and alcohol by their being present both at the same time. In other words, by the mixture of the alkaloids their solubility in water is increased. Have you had any experience with such a mixture?

Mr. Maisch.—I have not had any experience with it.

Mr. Menninger.—I have it from a paper read the other day at the New York College of Pharmacy, that the solubility was increased by their all being present in the solvent at the same time. The writer mentioned more especially quinia and cinchonia, that the quinia would render the cinchonia more soluble, and *vice versa*. It was to me a new point and a remarkable one. Mr. D. Robbins read the paper before the New York College of Pharmacy on the subject of quinia.

Mr. Maisch.—As important as I consider the query, I am sure we have not had any answer to it. If the committee can find any one who will prepare to answer it, it would be very well.

Mr. Menninger.—It is continued until next year and accepted by Mr. Saunders.

The Association then adjourned until two o'clock in the afternoon.

Fifth Session.—Thursday Afternoon, November 28th.

The meeting was called to order by President Luhn. The minutes of the fourth session were read and approved.

An invitation from the Local Committee on Arrangements was received and accepted with thanks to attend a concert and social entertainment in Concordia Hall on the same evening.

Mr. Scheffer read Mr. Mercein's report (see page 789) on Query 52, referring to the Preparation of Chemicals by the Pharmacist.

MR. MENNINGER.—With one of the preparations, mentioned by Mr Mercein, the citrate of iron and quinia, there is a difficulty owing to the extensive surface required ; but, on the other hand, when you notice that citrate of iron and quinia is almost always prescribed in liquid form, the utility of a solution of definite strength is easily seen. The trouble is to determine the weight, and the proportion of the salt in the liquid can only be determined from the specific gravity and weight. Owing to the inducements by manufacturers to give a cheap article, there are scarcely two factories turning out citrate of iron and quinia of the same quinine strength. I believe it to be one of the preparations which it is most important for us to manufacture ourselves.

MR. SCHEFFER.—I use a surface eighteen by twenty inches. When the solution has been concentrated to a proper consistency, it is very easy to expose the plate upon which you spread it to the air, and it can be easily dried.

MR. MENNINGER.—The difficulty with us in the larger cities is in obtaining a sufficiently clean place where we can have a current of air for drying which is not loaded with dust and vegetable matter.

MR. LUHN.—I was for awhile in a situation where I had a considerable amount to prepare. I determined the amount of liquid by the quinine it contained, using one part quinine to sixteen of the solution, and I found it was very handy, and at the same time I was certain of the proper amount of quinine.

MR. MAISCH.—The strength of the solution could be easily ascertained by drying a small portion and weighing the residue. But it is not only the citrate of iron and quinia which it is important for the pharmacist to make, but a large number of other preparations enumerated in Mr. Mercein's paper. He is perfectly correct in stating that these preparations may be made with the most primitive apparatus, such as may be found in every drug store, and most of them can be made at times when the pharmacist is frequently idle. I had adopted a somewhat similar plan as Mr. Mercein's. As a rule, I never dispensed any extracts or fluid extracts that were not made by myself On close calculation, I found that if a calculation was made for the labor—which actually costs nothing—they were much cheaper than the same preparations of good quality found in the market. It is very obvious that the manufacturer should charge for the time, labor, fuel, and other expenses.

On the other hand, if the pharmacist makes the preparations those additional charges need not come in, or only in some cases, because the work is done at a time when not engaged in putting up prescriptions or by other shop duties. A large number of pharmaceutical and chemical preparations may be made by the pharmacist. The pharmacist will then become familiar with the drugs and materials used. Pharmacists and their apprentices often grow up and remain years in business without becoming acquainted with the common drugs, because the various preparations are bought. When fluid extracts, etc., are purchased, the apothecary has no means of familiarizing himself with the drugs from which the articles are made.

Mr. Kennedy.—With regard to the benefit to be derived by clerks and apprentices from the preparation of chemicals, it is necessary for their employers to make many preparations, in order for them to understand the process of chemical change. I have had clerks who have never seen such an article as aromatic spirits of ammonia made. At first they thought it a wonderful thing to make this, but when they saw it made, they laughed at the idea that such a simple thing should ever be bought.

A volunteer paper by Mr. Murray (see page 792), discussing Uniformity in Chemical Terminology, was read and referred to the Executive Committee.

Mr. Maisch.—As I understand the suggestions, they are intended to apply to the use of these terms in the English language.

Mr. Murray.—They could become general.

Mr. Maisch.—Mr. Murray says the names of metals end in *ium*. Iron is a chemical name.

Mr. Murray.—As a chemical term, it would be ferrium.

Mr. Maisch.—I don't see the necessity to leave the English and go to the Latin.

Mr. Murray.—That is intended to apply to chemical tables.

Mr. Maisch.—For one part the Latin is intended to apply and the other the English.

Mr. Murray.—Yes, sir.

Mr. Saunders exhibited a number of samples of sachet powders, and read a volunteer paper on this subject, giving formulas for preparing the powders. The paper was read and referred. (See page 769.)

In connection with this subject the Secretary exhibited a sample of the volatile oil of Asarum Canadense, and gave the following information regarding it.

Mr. Maisch.—I have received the Asarum oil from our fellow-member, Mr. Boerner, of Iowa City, who writes as follows: "My former class-mate, and room-mate, Mr. A. H. Van Gorder, having suggested the use of a preparation of Asarum Canadense in perfumery, advancing the opinion that this drug played an important part in the preparation of the so popular Hoyt's German Cologne, we were induced to try it, and accordingly had a pound of the oil prepared by Messrs. Fritzsche, Schimmel & Co., of Hoboken, N. J. I am well satisfied that Mr. Van Gorder's conjectures regarding its use in the cologne mentioned are well founded. We are using the oil in colognes, and are pleased with it. We also use it in a water, prepared similarly to the mint and other waters of the Pharmacopœia, and for a syrup made by dissolving sugar in the water. Several of our physicians are using them as aromatics, and sometimes in preference to those so familiar to most of their patients." The volatile oil has evidently a remarkably sweet and persistent odor, and seems to be well adapted for such uses.

Mr. Saunders.—I notice that it has a resemblance to the oil of sandal. The danger in using such odors as this is, that they are so pungent that they may overcome all other odors. The gentleman says in his letter, that it reminds him of the smell of Hoyt's cologne; it has struck me often, and it now comes home to me.

A Member.—What is the permanency of these sachet powders?

Mr. Saunders.—I think you will find them as permanent as any sachet powders in the market.

Mr. Lloyd read a volunteer paper entitled Miscellaneous Notes, (see page 705), and exhibited a large number of samples in illustration of the statements and observations made. The paper was accepted and referred.

Mr. Menninger.—I will state that these California drugs, of which Mr. Lloyd treats, are on the table in this room, where they may be inspected.

Mr. Maisch.—I hope that a little more may be done than merely inspecting them. There has been a very reprehensible practice of late years of introducing medicines and recommending them in such a manner so that only a certain party can make them. One of the practices is to copyright a name, and then to induce medical men to order such copyrighted preparation in their prescriptions, thereby virtually compelling all pharmacists throughout the country to purchase the wares of one manufacturer. Another dishonest practice is to invent high-sounding chemical names, under which, at exorbitant prices, are sold cheap chemicals or the refuse products of manufacturing processes. Another sharp practice is that of selling new, or more frequently common, drugs by fictitious names. A case in point is a root which I have often received from various parts of the country as Indian root, toothache root, and under various other names. It was sold by itinerant doctors and peddlers over the country for about fifty cents an ounce, and was nothing else than galanga, an article that could be bought at that time for eighteen cents per pound. In this instance the public was fleeced, but in many other instances not only the people but the druggists and physicians are deceived.

Mr. Saunders.—I feel very much obliged to Mr. Lloyd for the information he has given us. I have endeavored for several years to get cascara sagrada, and the reply has always been that the bark could not be had, but that I had to get the fluid extract of it from Parke, Davis & Co. I didn't care to procure that, and have done without it. I am very thankful to Mr. Lloyd for his remarks. The peddlers sell this galanga root as a great medicine, and come to our stores and buy it at fifteen or twenty cents per pound.

Mr. Kennedy.—It is sold also as a great remedy for catarrh. After these peddlers had left our town, I have had people call for the great catarrh remedy or Indian root. I was not aware that any one else had experimented on the preservation of hydrocyanic acid with alcohol. I mentioned the subject some years ago before the Philadelphia College of Pharmacy, and am glad that Mr. Lloyd has referred to it now.

Mr. Maisch.—Mr. Lloyd does not claim this as his discovery. It is an old one. The hydrocyanic acid, as prepared under our Pharmacopœia process, is very unreliable. One of the strongest arguments against it is the loss of strength. A very weak acid, such as adopted in the German Pharmacopœia under the name of bitter almond water, keeps indefinitely—at least for years, and has been proposed by our fellow-member, Mr. Zwick, of Covington, Ky., as the only rational substitute for the unreliable stronger acid.

Mr. Lloyd.—I experimented under the formula in the Pharmacopœia, and the acid volatilized very rapidly when placed in open vessels and exposed to the air.

Mr. Menninger.—I would like to ask the strength of the aqua amygdalarum and aqua laurocerasi in the German Pharmacopœia.

Mr. Maisch.—Both are of the same strength, and contain one-tenth of one per cent. of hydrocyanic acid. Aqua cerasorum is one-twentieth of the strength of the former.

Mr. Lloyd.—We have a great deal of trouble with hydrocyanic acid. No dependence can be placed on its being kept. It often decomposes in a short time.

The report of the Auditing Committee was read by Mr. Lemberger as follows:

The committee appointed to examine the accounts, vouchers, etc., of our esteemed Treasurer, Charles A. Tufts, Esq., are pleased to report that they find said accounts, etc., correct in every detail, finding a balance in the hands of the Treasurer of eight hundred and sixty-two dollars and thirty-one cents ($862.31).

Your committee in addition desire to express their approbation of the neatness and accuracy characterizing the performance of the various duties of our worthy Treasurer.

Jos. L. Lemberger,
Geo. W. Sloan,
B. F. Moise.

Atlanta, Georgia, November 28th, 1878.

The report was on motion, accepted and adopted.

Mr. Lemberger.—We find on inquiry that our Treasurer has burdened himself with all the letters and receipts for the past twelve years. We believe there is no necessity of his preserving these after the reports have been entered on the minutes of this Association, and he will be much relieved if the Association will allow him to make a bonfire of all those old papers. We recommend that he be allowed to do so.

Mr. Maisch.—Would it not be better to allow them to be kept on hand as far back as three years.

Mr. Lemberger.—We accept the amendment.

The proposition that the Treasurer be authorized to destroy old letters and vouchers, after they had been kept on hand for three years, was adopted.

Mr. Lemberger read a paper on the Management of Storerooms and Cellars, written by Mr. J. F. Hancock in answer to Query 56 (see page 703). It was referred for publication.

A volunteer paper by Dr. Squibb on Fluid Extracts by Repercolation (see page 708) was read by Mr. Saunders.

Mr. Saunders.—I may mention that the way Dr. Squibb arrived at his examination of the amount of pressure was to get the man who did his packing to put his hand on the scale, and by testing it a number of times he reached in this way an approximation of the amount of pressure used in packing. There is one point in the paper of the doctor which is very important. It would seem quite possible with resinous articles, heretofore supposed to be capable of exhaustion by alcohol, to exhaust them by weak spirits. I would be glad to get the experience of other members of the Association, and would like to hear their opinions on the subject. I have known buchu to be extracted by diluted alcohol quite as well as by strong alcohol.

Mr. Menninger.—As this is a very important subject, and Dr. Squibb has already published an important paper on it, and as this paper is based on Dr. Squibb's previous work, being a continuation of his investigation, I now move that the previous report, together with this, be published in the Proceedings.

Mr. Saunders.—I second the motion. Many would like to see it there, but would not like to write to Dr. Squibb for it.

The proposition that Dr. Squibb's previously published paper on Fluid Extracts by Repercolation be published in the Proceedings, together with the paper now presented, was adopted.

On motion of the Business Committee, it was resolved that Professor Diehl's report on Fluid Extracts, prepared by him as a part of the report on Revision of the Pharmacopœia, be published in the Proceedings in case it should fail to arrive before the final adjournment of this meeting.

The following report was read:

The Nominating Committee would respectfully nominate Mr. Eli Lilly, of Indianapolis, Ind., as Local Secretary for next meeting.

(Signed) CHARLES A. TUFTS,
Chairman.
GEO. W. KENNEDY,
Secretary.

By vote of the Association, the Secretary was directed to deposit an affirmative ballot for the nominee, and Messrs. Ingalls, of Georgia, and McKenney, of Kentucky, having been appointed tellers by the chair, reported the election of Mr. Eli Lilly as Local Secretary for the ensuing year.

Mr. Ingalls read the following report:

REPORT OF THE COMMITTEE ON PRESIDENT'S ADDRESS AND PERMANENT SECRETARY'S REPORT.

The very valuable and instructive address of the President contains no suggestions as to the management of the affairs of the Association that require action of the committee. The committee would suggest that the Permanent Secretary tender the sincere thanks of the Association to the publishers of New Remedies and of the American Journal of Pharmacy for their courtesy in loaning wood-cuts for the volume of Proceedings, and also to Mr. Carney, of Lowell, for defraying one-half of the expenses of the portrait of his brother. The committee would suggest that the delegates now present and at future meetings should present to the Permanent Secretary the names and address of the President and Secretary of the association that they may represent, and that the names of those officers be published in the Proceedings.* As to that part of the report of the Secretary referring to changing the time of meeting, the committee would suggest that the time of holding the next meeting should be determined, at each meeting, with reference to the locality of the place adjourned to.

Respectfully submitted,

JAMES T. SHINN,
JOHN INGALLS,
F. T. WHITING.

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* This recommendation has been so indifferently responded to, that it was deemed best to defer the publication of the list of associations represented at the meeting for another year, and to request that the names and addresses of the officers be handed in with the credentials at the beginning of the First Session in Indianapolis.—PERMANENT SECRETARY.

It was moved and carried that the report be accepted, and the recommendations appended thereto be adopted.

Mr. Maisch.—I was much in hopes, Mr. President, that we could have some expressions at this meeting, and that these would go on our minutes, in regard to the best time for the Association to hold its meetings in the Southern States. I have felt for many years past that the Association has not done full justice to the Southern States, and that the meetings of the Association have not been held in the South as often as they perhaps should have been held. This year there has been considerable difficulty, and much hard work was imposed on Mr. Rankin, the Local Secretary, and a good deal of annoyance on the shoulders of the President and of the Executive Committee. From what I had previously learned from Southern members, it was against my judgment that the meeting should be held in September. But with the experience of the past year before us, and while assembled here in the heart of the South, this meeting should certainly be able to say, considering all the circumstances, whether it would be most advisable for the Association to convene in the South either in spring or in autumn, when Northern men can visit with safety every portion of the South.

Mr. Ingalls.—Mr. Secretary, the committee was in entire sympathy with your wishes on the subject, but the time of meeting had already been fixed, so we said nothing of it. I was very anxious myself to have June selected as the time for the next meeting; but we did not know what to do in relation to the matter.

Mr Land —I would like to say a word in relation to the matter. I came here this morning determined to vote for June as the time of the next meeting. I never thought of the short time which intervened. I changed my mind after the report of the committee and before it came to a vote. I have no doubt that we will finally change all our meetings to the month of May or June. We can then meet in any part of the United States. There is no fever anywhere in the South at that time. Yellow fever never breaks out, even in New Orleans, until July. I think it would be to the interest of the Association to make a change in the time of meeting, but I do not consider this a proper time to make the change. In the South, June is the dullest month we have in the year.

Mr. Murray.—I do not wish to contradict anything the gentleman has said, but in 1875 yellow fever occurred at Key West, Florida, in the middle of May.

Mr. Saunders.—I move that in the future, when our meetings are held in the South, they be on the second Tuesday in June.

Mr. Menninger.—What does the gentleman mean by the South?

Mr. Saunders.—I will make it as defined by the life insurance companies.

Mr. Menninger.—The life insurance policies differ; you must state some limit. I offer, as an amendment to the resolution, that when our meetings are held south of latitude 33, they shall be held on the second Tuesday in June.

Mr. Tarrant.—The committee considered as a whole whether it would be expedient or inexpedient to meet in June or September. Our object in considering that was to find whether June would be best suited to the interests of the members of the Association or not. We considered that June would be the better time, as it would best suit the convenience of many members. That question, however, has already been decided by the Association as a body. That time is past, and the question is too late. I hope now that some gentleman who voted in the affirmative will rise and call for a reconsideration of the question. We all know that in the South we can get off better in the spring than in the fall, and I hope that this matter will be reconsidered.

Mr. Menninger.—After mature consideration and conversation with Mr. Saunders, I withdraw my amendment and allow Mr. Saunders's motion to remain.

Mr. Saunders.—I would like to modify it now, and to move that when our meetings are held in the South, it be recommended to the Association to convene during the spring months.

Mr. Maisch.—This is merely a proper suggestion for the future. We cannot legislate for future meetings.

The resolution of Mr. Saunders, in its modified form, was then adopted unanimously.

The Business Committee requested permission to read several important papers containing many analytical results by title, and proposed that these papers be referred for publication. The request was granted and the motion adopted. The papers embrace the following essays:

Purification of Strychnia from Brucia, by Professor Prescott. (Page 806.)

Morphiometric Process for Opium, by Professor Prescott. (Page 807.)

Valuation of Tincture of Opium, by Professor Prescott. (Page 823.)

Separation and Estimation of the Cinchona Alkaloids, by A. B. Prescott and Hugo Thum. (Page 828.)

The Executive Committee proposed the following candidates for membership:

Alabama.

J. F. Hawkins, Mobile.
Thomas F. Moore, Mobile.

Connecticut.

Fred. Wilcox, Waterbury.

Oregon.

Charles E. Sitton, Portland.

Georgia.

David W. Curry, Cartersville.
P. J. Shumann, Atlanta.

Kentucky.

J. O. Burge, Bowling Green.
Jefferson Oxley, Nicholasville.

Messrs. Sloan, of Indiana, and Murray, of Pennsylvania, were appointed tellers and reported the unanimous election of the candidates.

The Business Committee called up for consideration the changes in the By-laws proposed in the report of the Committee on Ways and Means.

MR. SAUNDERS.—For the information of the meeting I would like the Secretary to state what the probable deficiency would be this year.

MR. MAISCH.—The Treasurer can better state that.

MR. MENNINGER.—Excuse me, gentlemen. The Treasurer's report may lead you into an error. That money spoken of as on hand is virtually mortgaged to the committee for the Proceedings.

MR. TUFTS.—A portion of it has already been paid out. Members say, "You have so much money on hand;" but we have not. We have it for purposes to which it is already pledged.

MR. SAUNDERS.—Can the Treasurer give us the information asked for?

MR. TUFTS.—I don't think I can.

MR. SAUNDERS.—Can you give it approximately?

MR. ROSE.—As I understand from the Treasurer's report, the deficiency from last year is about $100. There was cash on hand last year about $800, and at the beginning of the present year about $700. Am I right, sir?

MR. TUFTS.—The deficiency is $79.

MR. ROSE.—That is all that the Association has fallen behind in one year's business?

MR. MENNINGER.—Mr. Rose will excuse me. It is not only that $79. The Association has been embarrassed for some years past, and it has had to rely on the personal credit of its officers in the transactions with the publishers for the publication of the Proceedings, and with other business houses.

MR. WOOD.—Do I understand that our reports are sent to members who do not pay their dues?

MR. MAISCH.—No, sir. Members who under the old Constitution became life members are entitled to them under the By-laws.

MR. WOOD.—In a conversation with Mr. Rose this afternoon, he made a suggestion by which some expense might be saved to the Association.

MR. ROSE.—I suggested that instead of paying postage on the books, members might get them through the houses where they purchase their drugs.

MR. WOOD.—I think all the books for New England and New York State might be forwarded through two houses. The members could easily send to their wholesale druggists and have them forwarded with their goods at any time. Most of the New England pharmacists deal with Mr. Goodwin, in Boston, or with some druggist in New York.

MR. MENNINGER.—Of course these remarks of Mr. Wood are merely a suggestion. It is not worth while to make a provision of that kind in the

By-laws. The committee do distribute those books with as little expense as possible.

Mr. Maisch.—I have studied that matter very carefully for the last fifteen years, and I have endeavored every year to make these expenses a little less. There have been, however, complaints on the part of some that the books were sent to other places than their proper address, and during one year the complaints were rather numerous, particularly from the New England States. To remedy that I sent all that could be conveniently sent to one city by express. If I had my distributing book here I might be able to give the cost of sending the Proceedings to each town. If I can save the Association five or ten cents in sending it by express instead of by mail, I do so; and ten cents on several hundred packages amounts to a good deal. The entire expense for postage stamps and sending packages for the past year—and in that is included the correspondence of the Secretary and everything sent by express—is $220.

A Member.—For how many volumes?

Mr. Maisch.—There are about 1100 volumes sent out. Every State library, the United States Library, every college of pharmacy and pharmaceutical association having a library, and many public institutions received a copy free of charge. All that is included. The year before the amount was $232.69. Out of this I don't think we could save $30, and such a small saving would involve much disappointment to members and additional labor to the Secretary. When volumes can be sent in other packages I send them in that way. Last year the total expenses for the Proceedings, not including the Treasurer's salary, were $3540; the year before, $4569. So the difference in the expenditure of the two years is a little more than $1000 in favor of the last year.

Mr. Menninger.—I think that the only way we can meet deficiencies is by taxation per capita of the members of the Association. I don't like this method of making life members. If we adopt this method what will we do when all become life members?

Mr. Maisch.—Only the interest of that money can be used, and the Association would gradually acquire a reserve fund.

Mr. Menninger.—The interest will not amount to the annual payment of the members. This may give a temporary support, but eventually it will be a great deal worse for us.

Mr. Maisch.—The late Mr. Badger became a life member under the present By-laws, because, he said, at his advanced age it was almost the only thing of value that he could contribute to the Association, and that after he was gone the interest would be of value to the Association. The Association gets every year the interest thereon, and if we had a hundred or more of such members we would be very well off after awhile.

Mr. Menninger.—I inquire of you, Mr. Secretary, as you have had considerable experience in the Association, do you think this measure will give us anything but a temporary relief? Do you think the amount of money paid in will be equal to the annual contributions we would receive? A life member paying in now will become exempt from future payments.

Mr. Maisch.—Only exempt from annual contributions, but not from any special tax. You misapprehend the proposition of the committee. When a man becomes a life member on joining the Association, the payment of $75 is required. After he has paid the annual contribution for five years he can become, at the end of that time, a life member for $70.

Mr. Menninger.—But the point I am getting at is whether the interest on these amounts will be equal to the amount we now receive from them.

Mr. Maisch.—Of course not, in the beginning; but the object is a different one. It is well known that there are about a hundred life members under the old Constitution who have refused to give up their right to life membership, and most of whom receive the Proceedings without any cost to them. Besides these, an additional number of old members pay as long as they choose, and may refuse to pay their annual contributions at any time. They are life members under the old Constitution and have not given up their right. I have also advocated this, or a similar plan, thinking that some of those life members under the old Constitution who receive the Proceedings free and pay nothing, may become life members under this clause. They feel that they should not pay the $75, like incoming members, when for ten or twenty years they have paid their dues. It is true also that a number of others who have been members for years may come forward and become life members. It is possible that for a few years the Association may be a little hard up for funds, but I look to the future. I think if that plan had been adopted in 1867, when the old clause was abolished, there would now be a permanent fund in the treasury. In 1865 we had to levy a tax on the members. It was with great reluctance that the members paid that tax, and I would like to avoid it again. I would like to make a provision for the future, so that the Association need not periodically resort to the same means to raise money that we did before.

Mr. Wood.—I don't know that I understand the remarks of the Permanent Secretary, but I understand this, that life members always cause more or less trouble. We feel that we have to send out so many volumes of Proceedings to those life members, and they do not pay their quota. In creating these life memberships, we feel that we make a pledge to send out the Proceedings. Afterwards we feel that they do not do their duty if they do not contribute. These old life members felt that they were honestly entitled to receive those Proceedings without being called on for any additional tax. Now the Proceedings are four or five times as large, and we have to continue sending them to those members. I should think that life memberships were not a valuable thing to any association. I believe it is right that every year should pay its own expenses, and when the Secretary sends out the Proceedings it should be attended with a pro rata charge to each member for the expenses of the Association. I do not see why we cannot get along better in that way than under the life membership system. Interest varies; and again we may put the money in some place where we may lose it. I think it best to have a pro rata tax on each member to make up the deficit.

Mr. Land.—I have listened with interest to the remarks of Brother Wood. He is right in some respects, wrong in others. We have in this Association as many as twelve hundred members. Suppose that they all become life members. Allowing $50 to each it would be $60,000. The idea of having a capital fund is a good one. It will be drawing permanent interest, and you will always have young men coming into the Association year after year, and the life memberships will continue to increase. I have belonged to this Association for twenty years. When I first joined it I don't think it had two hundred members. We now have twelve hundred, and it will continue to increase.

Mr. Shinn.—The question before the Association is on the change in the By-laws. Two methods of increasing the funds of the Association have been proposed. This method of obtaining life members I do not think is a sufficient inducement to the members to come up and add to the funds. Few of the young men who belong to the Association can afford to pay $75. I think that when we have a deficit in the treasury the best plan is to levy a tax on the members.

Mr. Sloan.—I would like to inquire of the Permanent Secretary what saving can be effected by furnishing these life members with the unbound volumes of the Proceedings.

Mr. Maisch.—The binding costs about twenty-seven cents per volume. There are about two hundred usually bound in paper. We send it to exchanges unbound. I think the difference would be about twenty-two or twenty-five cents.

Mr. Sloan.—Well, it is such a trifling matter that it would scarcely be worth acting on. I am of the opinion of Mr. Shinn—that it is best that an assessment should be made.

Mr. Menninger.—As the second proposition covers a failure of the first, and is sufficient to meet the emergency, I move the adoption of the proposition made by the committee. In case the proposition should fail, the second, of a tax on the members, will fully cover the first. I move the adoption of both.

Mr. Rose.—Would it not be well to let the members pay the postage?

Mr. Shinn.—That would simply be taking it out of one pocket and putting it into the other.

Mr. Kuhn.—It seems to me that the proposition as to life members is really advantageous to the Association. Suppose one member gives $75. That would bring $5 per year interest. In twenty years that would be $100, and his annual contribution at the end of that time would be $100. At the end of the twenty years, under this plan, the Association would still have the $75.

Mr. Sloan.—There is too much "if" about the whole proposition. I have been in the Association about twenty years, and I think the two propositions which Dr. Menninger refers to, as covering each other, are like the Siamese twins—they will both die together. I think it is best, as Mr. Shinn says, to tax the members.

Mr. Maisch.—I stated last year that I was exceedingly loath to touch on this matter. I knew it would take up a good deal of valuable time of the Association. I now think it would be best to let this subject lay over and dispose of it at the next annual meeting, and I have a motion to offer to that effect. It seems to me that by that time we could have weighed the subject from all sides and determined what is best, and without much discussion the subject could be finally disposed of.

MR. MENNINGER.—I withdraw my motion.

MR. MAISCH.—I then move that this subject be made the special business of the third session of the twenty-seventh annual meeting.

The motion that this subject be made the special business of the third session of the twenty-seventh meeting was carried unanimously.

The Association then adjourned until Friday morning at 9 o'clock.

Sixth Session.—Friday Morning, November 29th.

Pursuant to adjournment the Association met this morning, President Luhn in the chair. The minutes of the fifth session were read by the Secretary and approved.

Mr. Scheffer read Prof. Diehl's report on Fluid Extracts, which is a part of the report of the Pharmacopœia Committee, and exhibited a large number of Fluid Extracts prepared in accordance with the design described. (See page 681.)

Mr. Scheffer also presented a paper on Percolation, contributed by Mr. E. A. Joy, who is not a member of the Association. It was, on motion, referred to the Pharmacopœia Committee.

The Business Committee moved that in view of the inability of several members of the Pharmacopœia Committee to act, Mr. E. H. Sargent be appointed in place of A. E. Ebert, J. U. Lloyd in place of E. S. Wayne, and Louis Dohme in place of J. F. Hancock.

MR. LLOYD.—I would like very much to be excused from serving on that committee. I feel that there are others who could more satisfactorily fill the position which has been assigned to me, and I feel also that I could do more for the benefit of the Association as a committee of one on certain specialties.

MR. MENNINGER.—We have given much consideration to this, and we think we have consulted the best interests of the Association in placing Mr. Lloyd on the committee.

MR. MAISCH.—Mr. Lloyd will have ample opportunities to pursue his specialties while on the committee.

Mr. Lloyd.—I would like to ask if the members of the committee have to agree to every formula in the Pharmacopœia.

Mr. Maisch.—Not at all. Of course the majority of the committee will determine the formula, but the minority are at liberty to dissent from their views.

Mr. Lloyd.—Very well, then. Under these conditions I accept the position.

The resolution was unanimously adopted. The following was also offered by the Business Committee.

Resolved, That the thanks of this Association are hereby tendered the Committee of Arrangements for the completeness of its work in every particular; to the druggists and citizens of Atlanta for the uniform kindness and hospitable attention shown to the members of this Association during their stay in the Gate City of the Empire State of the South.

Mr. Maisch.—I heartily second that motion, Mr. President, and I do so with great pleasure because I know the immense trouble which these gentlemen have had. The Association at large can hardly appreciate the difficulties under which they have labored, since they actually had to make preparations for two meetings. The executive officers know more of this, and for myself and for every visiting member, I can say that we feel truly grateful to every one who has helped to entertain us on this occasion, and labored towards making this meeting a success.

Mr. Saunders.—I am sure we all can heartily agree with the words which have fallen from the lips of Professor Maisch. We have had a very pleasant time indeed, and we deeply appreciate the kindness which has been shown us by the citizens of Atlanta. We hope to see a large attendance of the Southern members next year at Indianapolis, and I am sure we will be ready to welcome them there or anywhere else in the North, and return the kindness we have received in Atlanta.

The resolution was adopted by acclamation.

Mr. Schumann.—Mr. President and gentlemen: On behalf of the druggists of Atlanta, I would like to say that our gratitude for your kind appreciation is only surpassed by our pleasure in seeing the members of the Association from various parts of the country in our midst. I hope that the time will soon come when Mason and Dixon's line and all other lines of demarcation will have faded away.

The Business Committee also proposed a vote of thanks, which was agreed to, to the reporter and proprietors of the *Daily Constitution*, for the kindly notices and full and correct reports of the daily proceedings of the Association.

Mr. Lemberger, from the Committee on Powers's Memorial, offered the following:

To the Officers and Members of the American Pharmaceutical Association.

Your Committee appointed to note the death of the late Thomas H. Powers, beg leave to offer the following tribute:

Whereas, This Association has been apprised of the death of Mr. Thomas H. Powers, late of the city of Philadelphia, Pa., who, although not a member of this body, has become endeared to us, and his memory deserves a suitable tribute at our hands; and whilst we bow with submission to the Divine decree, we nevertheless feel a painful sadness in the thought, that one whose lifelong devotion to the study and development of the science of chemistry and pharmacy in our country has been removed; whose character was unalloyed with blemish, whose fame as a man of strictest integrity and honorable purpose, whether viewed from a commercial or social standpoint, has spread far and wide, whose kindness of heart knew no bounds so long as he was cognizant of its demands, and whose every act was prompted by a conscientious duty; we feel that in his death we are bereft of his useful influence and much valued encouragement in all that appertains to the highest interests of our Association. Therefore,

Resolved, That this Association has an unfeigned, though a melancholy satisfaction, in testifying its mark of appreciation of his service as a sincere humanitarian, a friend of education, and an unexceptionable example for us all, a shining mark among the illustrious and useful men of this age, whose exemplary life is worthy of highest admiration, and in whose footsteps we may with safety be emulated to follow.

Resolved, That as this Association represents large commercial enterprises and interests, we find embodied in the life of the deceased those elements of virtue and purity of character, to which we are proud to point as typical of all that constitutes the highest order of business integrity.

Resolved, That the sympathy of this Association is mingled with that of the numerous beneficiaries of the deceased, and by this tribute is hereby tendered to the surviving afflicted family and firm of which he was a much-revered member, trusting that the affliction thus visited upon them will be followed by the comfort, that a recollection of a life so usefully spent is more honorable and enduring than any other monument or tribute that can possibly be raised to his memory.

Resolved, That a copy of this memorial expression be forwarded to the family and firm of the departed.

Respectfully submitted.

Jos. L. Lemberger,
John Ingalls,
Robert S. Drake.

The Secretary called the attention of the meeting to some Georgia products, placed upon the table by Mr. Ingalls, namely some corkwood, with the adhering bark, and a specimen of true tea. It was stated the cork oak and the Chinese tea plant are successfully cultivated in Georgia and some neighboring States and that in the not distant future the demand of the United States might to some extent be supplied by these domestic products. A specimen of true saffron raised in Lebanon County, Pennsylvania, was likewise shown, and a specimen of imported saffron adulterated with gypsum to a considerable extent.

MR. MENNINGER —I have not had time to prepare a resolution to that effect, but I hope that some one will offer a resolution in recognition of the conduct of our brethren in the late yellow fever epidemic, who heroically stood to their posts. (Applause.) Those who have passed through a yellow fever epidemic—as your humble servant has—at times when the nearest blood relatives have deserted their kin, and left them to those who have the heart of the good Samaritan, appreciate the services of the latter and to what extent they are deserving of recognition. I hope some member will draw up a resolution in recognition of those heroes of our profession. (Applause.)

Subsequently Mr. Saunders offered the following resolution, which was unanimously adopted:

Resolved, That the heroism of our fellow-pharmacists in the plague-stricken districts in the Valley of the Mississippi who have nobly stood by their posts in the hour of danger is worthy of all commendation, and this Association desires to place on record at this time its admiration of their noble daring in thus aiding suffering humanity at the risk of their own lives

The Business Committee nominated Mr. Louis Dohme to act as chairman of the Pharmacopœia Committee in place of Mr. Chas. Rice, resigned, and he was duly elected.*

The Business Committee moved a vote of thanks to the President and officers of the Association for the devotion and efficiency with which they have attended to their duties. The resolution was adopted and responded to by the President for himself and in behalf of the other officers.

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* About a month after adjournment the Secretary had a personal interview with Mr. Dohme, and ascertained that he was still suffering from an affection of the eyes, which for some time past had rendered it necessary for him to devote a minimum of time only to reading and writing, so that it was impossible for him to accept the position. In the meantime, fortunately, Mr. Rice's health had somewhat improved, and at the earnest solicitation of several members, Mr. Rice again consented to act as chairman of the Pharmacopœia Committee, for which position he was nominated by the Executive Committee with the approval of the President.—PERMANENT SECRETARY.

Mr. Scheffer, in behalf of the Committee on Papers and Queries, reported that only a small number of queries had been accepted for investigation during the coming year, of which the following is a list:

QUERY 1. The Resin of Leptandra Virginica (the Leptandrin of commerce) varies much in appearance and sensible properties. To what causes are these varying results to be attributed? What is the best process for the preparation of the resin and what is the average yield of the root?

Accepted by J. U. Lloyd, Cincinnati, Ohio.

2. An essay on Gelsemium Sempervirens, embracing the question as to what principle its activity is due, and whether the green root possesses any advantage over the dry?

Accepted by Gust. J. Luhn, Charleston, S. C.

3. Nearly all the Lactic Acid in use in this country is manufactured abroad. Cannot this acid be made as well and as cheaply in this country? Give a formula for its preparation.

Accepted by P. J. Schumann, Atlanta, Ga.

4. Eriodictyon Californicum is receiving attention for its action in lung diseases and bronchial affections. What is its therapeutical value and to what is its activity due? Make a chemical examination of it.

Accepted by Charles Mohr, Mobile, Ala.

5. Does Erigeron Canadense possess any medicinal properties after the volatile oil has been removed from it by distillation or by treatment with Petroleum Benzin?

Accepted by F. Marion Murray, Philadelphia.

6. Are the medicinal qualities of Cannabis Americana such as to warrant its place in the primary list of the United States Pharmacopœia?

Accepted by H. P. Tarrant, Augusta, Ga.

7. What is the therapeutic value of Ergot from Corn?

Accepted by Norman J. Kuhn, Salem, Ohio.

8. What is the source of supply of Spigelia? Does it come from the Spigelia Marilandica or from other plants?

Accepted by R. H. Land, Augusta, Ga.

9. An examination of the residuum liquid from Hydrastis Canadensis, from which Berberia has been separated, with a view to establish the identity of the acid with which the alkaloids are naturally combined.

Accepted by Emil L. Boerner, Iowa City, Iowa.

10. Should not the fluid extract and syrup of Seneka be prepared with an alkaline menstruum?

Accepted by George W. Kennedy, Pottsville, Pa.

11. Desired the best excipient for pills, bearing in mind the necessity for a permanently soft, pliable mass and solubility in the stomach.

Accepted by F. Marion Murray, Philadelphia.

12. Aromatic Spirits of Ammonia has been proposed as a menstruum for exhausting lupulin. Has this any advantage over alcohol.

Accepted by C. T. George, Harrisburg, Pa.

13. On dissolving solids in water or in other liquids, a change of bulk is generally produced, consisting in nearly every case of an increase of volume. It is desired to work out a table of the changes of bulk produced by dissolving definite quantities of officinal solids in definite quantities of menstrua.

Accepted by P. C. Candidus, Mobile, Ala.

14. What is the best process for preparing powdered extracts? Report on the feasibility of preparing them of a definite strength by evaporating the fluid extracts on milk-sugar. Give practical working formulas.

Accepted by C. T. George, Harrisburg, Pa.

15. Can any of the decoctions or infusions of the United States Pharmacopœia be satisfactorily prepared from the fluid extracts of the United States Pharmacopœia, and in what particulars do they differ from infusions and decoctions prepared in the prescribed manner?

Accepted by William Saunders, London, Ont.

The Executive Committee proposed Mr. P. L. Turnley, of Rome, Ga., for membership. The chair appointed Messrs. Candidus, of Alabama, and Griffith, of New York, tellers, who reported the unanimous election of the candidate.

Mr. Mohr read a partial report on the Exhibition, and, on motion, permission was granted to the committee to finish their report after adjournment.

At the suggestion of the Business Committee an appropriation of ten dollars was made to the Committee on the Revision of the Pharmacopœia, to make up the deficiency in the expenses of last year, and an appropriation of twenty-five dollars toward defraying the expenses of the current year.

The Business Committee urged upon the members not to neglect the Centennial Fund, but to send their contributions forward at an early date to the chairman of the Executive Committee.

The minutes of the sixth session were then read by the Secretary, and, on motion, approved, after which, at 11 o'clock, A.M., the Association adjourned to meet again in the city of Indianapolis, Ind., on the second Tuesday of September, 1879, at 3 o'clock, P.M.

The following delegates to the twenty-sixth annual meeting became members by signing the Constitution, in conformity with Chapter VI, Article VI, of the By-laws:

Georgia.

Norman J. Brunner, Macon.
T. L. Massenburg, Macon.

Kentucky.

Jesse F. McKenney, Shelbyville.

Missouri.

Robert S. Drake, St. Louis.
H. E. Lindeman, St. Louis.
J. W. Tomfohrde, St. Louis.

Pennsylvania.

George Ross, Lebanon.

JOHN M. MAISCH,
Permanent Secretary.

At an early day in the year the pharmacists and druggists of Atlanta commenced to make preparations for the entertainment of the members of the Association. The rapid spread in the latter part of summer of the yellow fever caused such a panic among the members living in the Northern States, that the Executive Committee and officers found it impossible to resist the pressure that was brought to bear upon them in favor of postponing the meeting. All the work done by the Local Committee of Arrangements for September, had to be done over again to prepare for the meeting at the end of November. In consequence of this change in the time of the meeting, a number of ticket offices in the West and North failed to receive proper notices from their passenger agents of the reduction in fare, which they had agreed upon with Mr. Rankin the Local Secretary; and in consequence of this failure, several members, mainly from the West, being unable to obtain the excursion tickets, were prevented from being present at Atlanta.

For the members east of the Alleghanies, travelling arrangements had been made with the Kennesaw Road and with the Piedmont Air Line; but the latter was selected by those coming from the North, the majority of whom, with their ladies, met on the train which reached Washington, D. C., at an early hour on Sunday morning, November 24th, and during the day were met by others who had preceded them to Richmond, Va., and Greensboro, N. C. On Monday about noon, the first Eastern party arrived at Atlanta, and were conducted to their hotels by the Reception Committee, who exerted themselves also in behalf of those arriving subsequently when it was more difficult to procure pleasant accommodations owing to the unusual influx of strangers, due to the fact that the Legislature of Georgia was in session at the time, and that three or four other conventions were held at Atlanta simultaneously with the meeting of this Association.

The visiting ladies were particularly well cared for, and received the constant attention of the Local Committee and of the resident ladies, who projected and accompanied them upon visits and drives to the many places of interest in and around Atlanta.

On the evening of Wednesday, November 27th, the members and their ladies sat down to a banquet tendered them by the druggists of Atlanta, and served in the spacious dining-room of Concordia Hall. The entertainment was enlivened by music from a fine band, and by a number of toasts and the happy responses thereto. President Luhn led with a toast to "Our Country," and was responded to by William Saunders, of Canada; the Local Secretary, J. W. Rankin, proposed "Our Guests," which was replied to by Dr. Menninger; then followed the Permanent Secretary with "The State of Georgia, the Empire State of the South," responded to by A. Candler; Dr. Taliaferro, "The American Pharmaceutical Association," responded to by President Luhn; the chairman of the Business Committee, Dr. Menninger: "Atlanta, the Gate City of the South," responded to by J. S. Pemberton, of Georgia; A. A. Menard of Georgia, "Our visiting and resident ladies," responded to by James T. Shinn; the Treasurer, C. A. Tufts, "The Committee of Arrangements," responded to by Theodore Schumann; W. A. Taylor, "The American Medical Association," responded to by Dr. J. S. Todd, of Georgia.

On the evening of Thursday another entertainment was given in Concordia Hall, consisting of instrumental and vocal music, which was highly enjoyed by all. The physical wants of those present were likewise not forgotten, and provided for in the shape of substantial refreshments.

On Friday, after the adjournment, a number of the visitors commenced their homeward journey in the afternoon, while another number enjoyed Atlanta hospitality until Saturday morning, when they likewise turned their faces towards home. It was a jolly party that travelled northward on that day through the picturesque scenes along the Piedmont Air Line; but once in awhile regret was expressed at the stern demands of duty, which called each one to his post, depriving him of the pleasures enjoyed by the happy twenty in the land of the alligator and of the orange groves, Florida. This trip had been arranged with commendable foresight by the Local Secretary, Mr. Rankin, and proved to be a source of pleasure and recreation to those who could extend for ten or twelve additional days their winter vacation in the sunny South.

JOHN M. MAISCH,
Permanent Secretary.

LIST OF PUBLICATIONS RECEIVED

For the American Pharmaceutical Association.

Societies and editors are respectfully requested to forward all publications intended for the American Pharmaceutical Association to the Permanent Secretary. European exchanges, if not sent by mail, will reach us through the Smithsonian Institution at Washington.

JOHN M. MAISCH,
145 North Tenth Street, Philadelphia, Pa.

The Druggists' Circular, New York, 1878.
New Remedies, New York, 1878.
Oil, Paint, and Drug Reporter, New York, 1878.
American Journal of Medical Sciences, Philadelphia, 1878.
Medical News and Library, Philadelphia, 1878.
The Pharmacist, Chicago, 1878.
Pacific Medical and Surgical Journal, San Francisco, 1878.
The Canadian Pharmaceutical Journal. Edited by E. B. Shuttleworth, 1878.
Pharmaceutical Journal and Transactions, London, October, 1877, to December, 1878.
Yearbook of Pharmacy and Transactions of the British Pharmaceutical Conference, 1877, 1877.
The Chemist and Druggist, London, 1878.
The Chemists' and Druggists' Diary, 1879.
Pharmaceutische Zeitschrift für Russland, 1877, Nos. 21–24; 1878, 1–18, 24.
Sitzungsberichte der K. Bayer. Akademie der Wissenschaften, 1876, 3; 1877, 1–3.
Die Geognostiche Durchforschung Bayerns. Von Dr. C. W. Gümpel, 1877.
Transactions of the American Medical Association. 17 vols.
Nachrichten von der K. Gesellschaft der Wissenschaften, etc. Göttingen, 1877.
Pharmaceutische Centralhalle, Berlin, 1878.
Archiv der Pharmacie, Halle, 1878.
Zeitschrift des allgemeinen oesterreichischen Apotheker-Vereines. Wien, 1878.
Anzeiger der K. K. Akademie der Wissenschaften. Wien, 1878.
Schweizerische Wochenschrift für Pharmacie, 1878.
Proceedings of the American Academy of Arts and Sciences, Boston, xiii.
Transactions of the Illinois State Medical Society, 1878. Twenty-eighth Annual Session. N. S. Davis, M.D., Secretary, Chicago.
Transactions of the Medical Society of the District of Columbia, 1878.

Transactions of the South Carolina Medical Association, 1878. H. D. Fraser, M.D., Secretary, Charleston.

Transactions of the Minnesota State Medical Society, 1878. C. H. Boardman, M.D., Secretary, St. Paul.

Annual Report of the Mercantile Library Company of Philadelphia, January, 1878.

Annual Report of the Trustees of the Astor Library Company of the City of New York, January, 1878.

Catalogue of Officers and Students of Trinity College, 1878.

Annual Reports of the Supervising Surgeon-General of the Marine Hospital Service of the U. S. for the fiscal years 1876 and 1877. Washington, D. C.

Calender of the University of Michigan for 1878–9.

LIST OF SOCIETIES, LIBRARIES, JOURNALS, AND INDIVIDUALS,

To whom complimentary copies of the Proceedings of this Association are forwarded.

The State Libraries of all the States of the Union except Connecticut.

Maine Pharmaceutical Association,	Portland,	Maine.
Bowdoin College,	Brunswick,	"
Dartmouth College,	Hanover,	New Hampshire.
New Hampshire Medical College Society, Dr. G. P. Conu, Secretary,	Concord,	"
Amherst College,	Amherst,	Massachusetts.
Harvard University,	Cambridge,	"
Massachusetts College of Pharmacy,	Boston,	"
American Academy of Arts and Sciences,	"	"
Medical Library Association,	"	"
City Library,	"	"
City Hospital,	"	"
Massachusetts General Hospital,	"	"
Boston Athenæum,	"	"
Vermont Pharmaceutical Association, A. W. Higgins, President,	Rutland,	Vermont.
University of Vermont,	Burlington,	"
Brown University,	Providence,	Rhode Island.
Trinity College,	Hartford,	Connecticut.
Medical Journal and Library Association,	"	"
Silas Bronson Library,	Waterbury,	"
Yale College,	New Haven,	"
College of Pharmacy of the City of New York,	New York,	New York.
Literary and Scientific Society of German Apothecaries,	"	"
Druggists' Circular,	"	"
New Remedies,	"	"
Oil, Paint, and Drug Reporter,	"	"
Astor Library,	"	"
Mercantile Library,	"	"
Long Island Historical Society,	Brooklyn,	"
Camden County Pharmaceutical Association,	Camden,	New Jersey.
New Jersey State Lunatic Asylum,	Trenton,	"

Philadelphia College of Pharmacy,	Philadelphia,	Pennsylvania.
College of Physicians,	"	"
Pennsylvania Hospital,	"	"
Academy of Natural Sciences,	"	"
American Philosophical Society,	"	"
Philadelphia Library,	"	"
Mercantile Library,	"	"
American Journal of Medical Sciences,	"	"
Medical Society of the State of Pennsylvania,	"	"
Maryland College of Pharmacy,	Baltimore,	Maryland.
University of Maryland,	"	"
Maryland Academy of Sciences,	"	"
Smithsonian Institution,	Washington,	Dist. Columbia.
Congressional Library,	"	"
Surgeon-General, United States Army,	"	"
Surgeon-General United States Marine Hospital Service,	"	"
Bureau of Education,	"	"
Department of Agriculture,	"	"
National College of Pharmacy,	"	"
Library of the American Medical Association,	"	"
Medical Society of the District of Columbia,	"	"
Richmond Pharmaceutical Association,	Richmond,	Virginia.
Medical Society of Virginia, L. B. Edwards, M.D., Secretary,	"	"
South Carolina Medical Association, Dr. H. D. Fraser, Secretary,	Charleston,	South Carolina.
Tennessee College of Pharmacy,	Nashville,	Tennessee.
Louisville College of Pharmacy,	Louisville,	Kentucky.
Cincinnati College of Pharmacy,	Cincinnati,	Ohio.
Cincinnati Academy of Medicine,	"	"
Longview Asylum,	Carthage,	Hamilton Co., O.
University of Michigan,	Ann Arbor,	Michigan.
Chicago College of Pharmacy,	Chicago,	Illinois.
Illinois State Medical Society,	"	"
St. Louis College of Pharmacy,	St. Louis,	Missouri.
St. Louis Academy of Science,	"	"
St. Louis Mercantile Library,	"	"
St. Louis Public School Library,	"	"
Kansas State University,	Lawrence,	Kansas.
Minnesota State Medical Society, C. H. Boardman, M.D., Secretary,	St. Paul,	Minnesota.
California Pharmaceutical Society,	San Francisco,	California.
Pacific Medical and Surgical Journal,	"	"
Montreal College of Pharmacy,	Montreal,	Canada.
Ontario College of Pharmacy,	Toronto,	"
Escuela de Farmacia, Mexico.		

Sociedad Medico-farmaceutico, Merida, Yucatan.
Sociedad de Farmacia Argentina, Buenos Aires.
British Pharmaceutical Conference, Dr. J. Attfield, London.
Pharmaceutical Society of Great Britain, London.
Pharmaceutical Journal and Transactions, London.
Chemical News, London.
Chemist and Druggist, London.
Journal of Applied Science, London.
British Museum, London.
Philosophical Society, Glasgow.
Liverpool Chemists' Association.
Association of Chemists and Druggists, Wolverhampton.
Coventry and Warwickshire Pharmaceutical Association, Coventry.
Pharmaceutical Society at Edinburgh.
Nederlandsche Maatschappij ter bevordering der Pharmacie, A. J. Rijk, President, Amsterdam.
Académie Royale de Médecine, Bruxelles.
Société de Pharmacie Royale de Bruxellés.
Société Royale des Sciences Médicales Naturelles, Bruxelles.
Société de Pharmacie d'Anvers.
Société de Pharmacie, Paris.
Académie des Sciences, Paris.
Répertoire de Pharmacie, Paris.
Schweizerische Wochenschrift für Pharmacie, C. W. Stein, St. Gallen.
Zeitschrift d. Allg. Oesterreichischen Apotheker Vereins, Wien.
K. K. Gesellschaft der Aerzte, Wien.
K. Akademie der Wissenschaften, Wien.
K. Bayer, " " München.
University of Strasburg.
Journal de Pharmacie d'Alsace-Lorraine, n. Nicklès, Benfeld.
Deutscher Apotheker-Verein.
Archiv der Pharmacie, Waisenhausbuchhandlung, Halle.
Prof. Dr. Wöhler, Göttingen.
K. Akademie der Wissenschaften, Göttingen.
Verein der Apotheker, Berlin.
Pharmaceutische Centralhalle, Dr. H. Hager, Pulvermühle bei Fürstenberg.
Pharmaceutische Zeitung, Bunzlau.
Pharmaceutische Gesellschaft in St. Petersburg, St. Petersburg.
Pharmaceutischies Institu, Dorpat, Russia. .
Pharmaceutical Institution, Stockholm, Sweden.
Kongelige Norske Universitet i Christiani.
Archiv for Pharmaci, S. M. Trier, Kjobenhavn.
Danmark's Apotheker Forening, Gust. Lodze, President, Odense.
Centro Pharmaceutico Portuguez, Porto, Portugal.
R. Biblioteca Nazionale, Firenze, Italy.
Pharmaceutical Society of Victoria, Melbourne, Australia.

CONSTITUTION AND BY-LAWS

OF THE

AMERICAN PHARMACEUTICAL ASSOCIATION.

CONSTITUTION.

ARTICLE I. This Association shall be called the "American Pharmaceutical Association." Its aim shall be to unite the educated and reputable Pharmaceutists and Druggists of the United States in the following objects:

1. To improve and regulate the drug market, by preventing the importation of inferior, adulterated, or deteriorated drugs, and by detecting and exposing home adulteration.

2. To encourage proper relations between Druggists, Pharmaceutists, Physicians, and the people at large, which shall promote the public welfare, and tend to mutual strength and advantage.

3. To improve the science and art of Pharmacy by diffusing scientific knowledge among Apothecaries and Druggists, fostering pharmaceutical literature, developing talent, stimulating discovery and invention, and encouraging home production and manufacture in the several departments of the drug business.

4. To regulate the system of apprenticeship and employment, so as to prevent, as far as practicable, the evils flowing from deficient training in the responsible duties of preparing, dispensing, and selling medicines.

5. To suppress empiricism, and to restrict the dispensing and sale of medicines to regularly educated Druggists and Apothecaries.

6. To uphold standards of authority in the Education, Theory, and Practice of Pharmacy.

7. To create and maintain a standard of professional honesty equal to the amount of our professional knowledge, with a view to the highest good and greatest protection to the public.

ARTICLE II. This Association shall consist of active, life, and honorary members, and shall hold its meetings annually.

ARTICLE III. The officers of the Association shall be a President, three Vice-Presidents, a Permanent Secretary, a Local Secretary, a Treasurer, and a Reporter on the Progress of Pharmacy, all of whom, with the exception of the Permanent Secretary, shall be elected annually, and shall hold office until an election of successors.

ARTICLE IV. All moneys received from life membership, together with such funds as may be bequeathed, or otherwise donated to the Association, shall be invested by the Treasurer in United States Government or State securities, the annual interest of which only shall be used by the Association for its current expenses.

ARTICLE V. Every proposition to alter or amend this Constitution shall be submitted in writing, and may be balloted for at the next Annual Meeting; when, upon receiving the votes of three-fourths of the members present, it shall become a part of this Constitution.

BY-LAWS.

CHAPTER I.

Of the President and Vice-Presidents.

ARTICLE I. The President shall preside at all meetings of the Association; in his absence or inability, one of the Vice-Presidents, or in the absence of all, a President *pro tempore* shall perform the duties of President.

ARTICLE II. In the absence of the Permanent Secretary, the President shall appoint a Recording Secretary *pro tempore.*

ARTICLE III. In meetings the President shall take the chair at the proper time; announce all business; receive all proper motions, resolutions, reports, and communications, and order the vote upon all proper questions at the proper time.

ARTICLE IV. In all ballotings, and on questions upon which the yeas and nays are taken, the President is required to vote, but his name should be called last; in other cases he shall not vote, unless the members be equally divided, or unless his vote, if given to the minority, will make the decision equal, and in case of such equal division the motion is lost.

ARTICLE V. He shall enforce order and decorum; it is his duty to hear all that is spoken in debate, and in case of personality or impropriety he shall promptly call the speaker to order. He shall decide all questions of order, subject to the right of appeal, unless in cases where he prefers to submit the matter to the meeting; decide promptly who is to speak when two or more members rise at the same moment; and be careful to see that business is brought forward in proper order.

ARTICLE VI. He shall have the right to call a member to the chair, in order that he may take the floor, in debate. He shall see that the Constitution and By-laws are properly enforced.

Article VII. He shall appoint all committees, unless provided for in the By-laws, or otherwise directed by the Association.

Article VIII. He shall sign the certificates of membership, and countersign all orders on the Treasurer. He shall obey the instructions of the Association, and authenticate by his signature, when necessary, its proceedings.

Article IX. He shall present at each annual meeting an address, embodying general scientific facts and events of the year, or discuss such scientific questions as may to him seem suitable to the occasion.

CHAPTER II.

Of the Permanent Secretary.

Article I. The Permanent Secretary shall be elected to hold office permanently, during the pleasure of the Association. He shall receive from the Treasurer an annual salary of $600, and the amount of his expenses incident to the meeting in addition to his salary.

Article II. He shall preserve fair and correct minutes of the proceedings of the meetings, and carefully preserve, on file, all reports, essays, and papers of every description received by the Association, and shall be charged with the necessary foreign and scientific correspondence, and with editing, publishing, and distributing the Proceedings of the Association, under the direction of the Executive Committee.

Article III. He shall read all papers handed him by the President for that purpose; shall call and record the yeas and nays whenever they are required to be called; shall notify the chairman of every special committee of his appointment, giving him a list of his colleagues, and stating the business upon which the committee is to act; and shall notify every member of the time and place of each annual meeting.

Article IV. He shall be, ex-officio, a member of the Executive Committee.

CHAPTER III.

Of the Local Secretary.

Article I. The Local Secretary shall be elected annually, near the close of the Annual Meeting, and shall reside at or near the place where the next Annual Meeting of the Association is to be held.

Article II. He shall assist the Permanent Secretary in his duties; shall co-operate with any local committee in making arrangements for the Annual Meeting; shall correspond with the chairman of the several committees, and with other members, in advance of the meeting, for the promotion of its objects, and shall have the custody of specimens, papers, and apparatus destined for use or exhibition at the meetings.

CHAPTER IV.

Of the Treasurer.

Article I. The Treasurer shall collect and take charge of the funds of the Association, and shall hold, sign, and issue the certificates of membership.

Article II. He shall pay no money except on the order of the Secretary, countersigned by the President, and accompanied by the proper vouchers.

Article III. He shall report to the Executive Committee, previous to each Annual Meeting, the names of such members as have failed to pay their annual contributions for three years, and also the names of such as have failed to return their certificates of membership after having been officially disconnected with the Association, and having been duly notified to return them.

Article IV. He shall present a statement of his accounts at each Annual Meeting, that they may be audited; he shall receive an annual salary of $500, and the amount of his expenses incident to the meeting in addition to his salary.

CHAPTER V.

Of the Reporter on the Progress of Pharmacy.

Article I. The Reporter on the Progress of Pharmacy shall be elected annually, and shall receive from the Treasurer for his services such sum as may be annually determined upon.

Article II. All journals and volumes received in exchange for the Proceedings by the Permanent Secretary, and such other journals as shall be deemed necessary, shall be sent to him by that officer for use in the compilation of his report; for all of which he shall be held responsible until returned to the Permanent Secretary for preservation.

Article III. From these and other available sources he shall prepare a comprehensive report on the improvements and discoveries in Pharmacy, Chemistry, and Materia Medica, and the collateral branches of knowledge; on the changes in condition of Pharmaceutical Institutions, together with such statistical, biographical, and obituary notices as will furnish an epitome of the progress and changes in the science and practice of Pharmacy, and of its votaries at home and abroad.

Article IV. The Report on the Progress of Pharmacy shall commence with July 1st of the preceding year, and end with June 30th of the year in which it is submitted, shall be written in a form fitted for the printer, and shall be presented completed at the Annual Meeting.

Article V. In case of the illness or other inability of the Reporter to carry on the work of the report, the Permanent Secretary and the Chairman of the Executive Committee shall be required to make the best arrangements they can command, to continue the work to its completion.

CHAPTER VI.

Of Committees.

Article I. There shall be elected annually six standing committees: An Executive Committee, and a Committee on the Drug Market, each to consist of five members; a Committee on Papers and Queries, a Business Committee, a Committee on Prize Essays, and a Committee on Legislation; each to consist of three members.

Article II. The Executive Committee, of which the Permanent Secretary shall be a member, shall have charge of the revision of the Roll, the investigation of application for membership, and the publication of the Proceedings.

Article III. They shall report at each meeting a revised roll of members, with appropriate notices of deceased members, and the names of any who, having become disconnected with the Association, refuse to return their certificates of membership as provided by the By-laws.

Article IV. They shall furnish to each member of the Association not in arrears one copy of the annual publication of the Proceedings, which publication shall contain the correct roll of members, full minutes of the several sittings, the Reports of the President and of the Committees, together with such addresses, scientific papers, discussions, notices of new processes, and preparations, as the Executive Committee may deem worthy of insertion, and shall fix the price at which the Proceedings shall be sold.

Article V. The Committee on the Drug Market shall report annually the condition of the Drug Market, the fluctuations in the supply and demand of drugs and chemicals, the variations in quality, and the adulterations and sophistications coming under their observation or reported to them by others, with any suggestions or recommendations for the improvement or better regulation of the trade; and they shall be authorized to report upon any adulterations and sophistications of immediate interest, through the Pharmaceutical Journals, as soon as practicable after their discovery.

Article VI. The Committee on Papers and Queries shall receive all Reports of Standing Committees, and all papers for the Association. They shall designate which of them shall be read at length, or which by title, and shall be furnished with a synopsis of each by the authors. They shall, in connection with the Business Committee, arrange the time which may be most appropriate or convenient for reading them.

Article VII. The Committee on Papers and Queries shall report, near the close of each Annual Meeting, a proper number of questions of scientific and practical interest, the answers to which may advance the interests of Pharmacy, and shall procure the acceptance of as many such questions for investigation as may be practicable.

Article VIII. Any person writing a paper for the Association must, to insure its publication in the Proceedings, refer the same with a synopsis of its contents to the Committee on Papers and Queries previous to the third session.

ARTICLE IX. It shall be the duty of every Standing Committee making a report annually to the Association, in like manner to furnish a copy of the same, together with a synopsis of its contents, to the Committee on Papers and Queries, before the first annual session of the Association.

ARTICLE X. The Business Committee shall be charged with the transmission of unfinished business from one Annual Meeting to another, and with collecting, arranging, and expediting the business during the sessions of the Annual Meetings.

ARTICLE XI. The Committee on Prize Essays shall, within six months after the Annual Meeting at which the essays are presented, determine which, if any of them, has met the requirements of the founder of the prize. In all other respects they shall be governed by the stipulations expressed by the donor. The decision of the committee, with such comments upon the successful essay only as they may deem proper, may be published in the journals of pharmacy.

ARTICLE XII. The Committee on Legislation shall keep a record of, and compile for reference, the enactments of the different States regulating the practice of pharmacy and the sale of medicines. They shall report to each stated meeting of the Association what legislation on the subject has occurred during the year.

CHAPTER VII.

Of Membership.

ARTICLE I. Every pharmaceutist and druggist of good moral and professional standing, whether in business on his own account, retired from business, or employed by another, and those teachers of Pharmacy, Chemistry, and Botany, who may be specially interested in Pharmacy and Materia Medica, who, after duly considering the objects of the Association and the obligations of its Constitution and By-laws, are willing to subscribe to them, are eligible to membership.

ARTICLE II. Any person eligible to membership may make application in writing, with the indorsement of any two members of the Association in good standing, to any member of the Executive Committee, who shall report his application to the said Committee.

If after investigating his claims they shall approve his election, they shall, at the earliest time practicable, report his name to the Association, and he may be elected by two-thirds of the members present on ballot.

ARTICLE III. No person shall be a member of this Association, nor shall his name be placed upon the roll, until he shall have signed the Constitution and paid into the Treasury the sum of *Five Dollars* as an initiation fee, and the annual contribution for the current year, with the exception of *Delegates*, as provided in Article VI of this chapter.

ARTICLE IV. Every member shall pay in advance to the Treasury the sum of *Five Dollars* as his yearly contribution, and is liable to lose his membership by neglecting to pay said contribution for *three successive years.*

Article V. Any member who shall pay to the Treasurer the sum of *seventy-five dollars at one time*, shall become a life member and shall be exempt from all future annual contributions.

Article VI. All local organizations of Pharmacists shall be entitled to *five* delegates, as their representatives in the Annual Meetings, who, *if present*, become members of the Association on signing the Constitution and paying the annual contribution for the current year, without paying the usual initiation fee.

Article VII. Members shall be entitled, on the payment of *Five Dollars*, to receive a certificate of membership signed by the President, one Vice-President, Permanent Secretary, and Treasurer, at the same time covenanting to return the same to the proper officer on relinquishing their connection with the Association.

Article VIII. Persons constitutionally elected to membership become permanent members, and their membership can cease only by resignation, non-payment of dues, or by expulsion, as provided in these By-laws.

Article IX. Resignation of membership shall be made in writing to the Permanent Secretary or Treasurer, but no resignation shall be accepted from any one who is in arrears to the Treasury.

All resignations shall be acknowledged in writing by the officer who receives them, and shall be reported at the next Annual Meeting.

Article X Any member may be expelled for improper conduct or the violation of the Constitution, By-laws, or Ethics adopted by the Association, but no person shall be expelled unless he shall receive for expulsion two-thirds of all the votes cast at some regular session.

Article XI. Pharmaceutists, chemists, and other scientific men, who may be thought worthy the distinction, may be elected honorary members. They shall not, however, be required to contribute to the funds, nor shall they be eligible to hold office, or vote at the meetings.

CHAPTER VIII.

Of Meetings.

Article I. The meetings shall be held annually; provided, that in case of failure of this from any cause the duty of calling the Association together shall devolve upon the President or one of the Vice-Presidents, with the advice and consent of the Executive Committee.

Article II. The order of business at the first session of each Annual Meeting shall be as follows:

Section 1. Promptly, at the time named in the notice issued for the meeting, the President, or in his absence one of the Vice-Presidents, or in their absence a President *pro tempore*, shall officiate.

Section 2. In the absence of the Permanent Secretary the President shall appoint a Recording Secretary *pro tempore*, who shall perform the duties of the Permanent Secretary until his arrival.

Section 3. Nineteen members shall constitute a quorum for the transaction of business.

Section 4. The President shall appoint a committee of three persons to examine the credentials of delegates, which committee shall attend to that duty. The President's address may then be read, after which the committee shall report to the Association as soon as practicable, when the Secretary shall call the roll, noting the names of the delegates and members in attendance.

Section 5. The Executive Committee shall present names recommended for membership, when the President, having ascertained that a quorum of members is present, shall order an election by ballot, and appoint two tellers.

Section 6. Reports of committees shall be presented, read by their titles, the synopsis, or in full, and laid on the table for future consideration.

Section 7. The President shall call the roll of Colleges and Associations represented, requesting each delegation in turn to appoint one member, the persons so selected to act as a committee to nominate officers and the Standing Committees for the ensuing year; in addition to which he shall appoint five members, who are not delegates, to act with the committee.

Section 8. The reports of the Executive Committee, of the Permanent Secretary, and of the Treasurer, shall be read by title or in full.

Section 9. A committee of five shall be appointed to examine and report upon specimens exhibited.

Section 10. Incidental business may be called up by the Business Committee.

ARTICLE III. The order of business at the second session of each Annual Meeting shall be as follows:

Section 1. The President shall call the Association to order.

Section 2. The Secretary shall read the minutes of the preceding meeting, which may be amended if necessary, and shall then be approved.

Section 3. The Report of the Committee on Nominations shall be read; when the President shall appoint tellers, and the Officers and Committees nominated shall be balloted for.

Section 4. The officers elected shall take their respective places.

Section 5. The Executive Committee shall present names recommended for membership, when a ballot shall be ordered for their election.

Section 6. Reports of Standing Committees shall be read.

Section 7. Reports of Special Committees shall be read.

Section 8. The second session shall close with the examination of specimens on exhibition.

ARTICLE IV. The order of business at subsequent sessions shall be determined by the Business Committee, with the consent of the Association.

ARTICLE V. *Section* 1. The Association invites manufacturers and others to exhibit at the annual meetings crude drugs, chemicals, pharmaceutical preparations, chemical and pharmaceutical apparatus and utensils, and such objects as possess a general scientific or special pharmaceutical interest.

Section 2. The following articles shall not be admitted to these exhibitions: Proprietary and patented medicines, medicinal or pharmaceutical preparations the names of which have been copyrighted or the complete working formula for which is withheld, and such chemical preparations or mixtures which are offered under other than their proper scientifically recognized names.

Section 3. The Committee on Exhibition, appointed under Chapter VIII, Article 2, Section 9, shall report during the meeting on the articles exhibited, with such comments as in their judgment may be deemed proper.

CHAPTER IX.

Of Rules of Order and Debate.

Article I. The ordinary rules of parliamentary bodies shall be enforced by the presiding officer, from whose decision, however, appeals may be taken, if required by two members, and the meeting shall thereupon decide without debate.

Article II. When a question is regularly before the meeting, and under discussion, no motion shall be received but to adjourn, to lay on the table, for the previous question, to postpone to a certain day, to commit or amend, to postpone indefinitely; which several motions have precedence in the order in which they are arranged. A motion to adjourn shall be decided without debate.

Article III. No member may speak twice on the same subject, except by permission, until every member wishing to speak has spoken.

Article IV. On the call of any two members, the yeas and nays shall be ordered, when every member shall vote, unless excused by a majority of those present, and the names and manner of voting shall be entered on the minutes.

CHAPTER X.

Miscellaneous.

Article I. In all such points of order as are not noticed in these By-laws the Association shall be governed by the established usages in all assemblies governed by parliamentary rules.

Article II. Every proposition to alter or amend these By-laws shall be submitted in writing, and may be balloted for at any subsequent session, when, upon receiving the votes of three-fourths of the members present, it shall become a part of the By-laws.

Article III. No one or more of these By-laws shall be suspended.

FORM OF APPLICATION FOR MEMBERSHIP.

Approving of the objects of the American Pharmaceutical Association, I am desirous of joining it in membership; and, having read its Constitution and By-laws, I hereby signify my approval of the same, and subscribe to them.

....

Address, ...

I hereby agree to return my certificate of membership in the American Pharmaceutical Association to the Treasurer of that body, if I shall hereafter cease to be connected in membership with it.

....

TESTIMONIALS.

The undersigned, members in good standing, being personally acquainted with of testify to his moral character, his skill as a practical Druggist and Pharmaceutist, and his professional probity and good standing, and they recommend him for membership in the American Pharmaceutical Association.

Name.	Address.

ROLL OF MEMBERS.

HONORARY MEMBERS.

UNITED STATES OF AMERICA.

Daniel B. Smith, Philadelphia, Penn., 1856

FOREIGN COUNTRIES.

AUSTRIA.

Anton von Waldheim, *Vienna*, 1871.

BELGIUM.

A. T. De Meyer, *Brussels*, 1868.
Norbert Gille, *Brussels*, 1868.

ENGLAND.

Dr. John Attfield, *London*, 1871.
Dr. Robert Bentley, *London*, 1872.
Henry B. Brady, *Newcastle-on-Tyne*, 1871.
Dr. J. Redwood, *London*, 1871.

FRANCE.

Dr. A. Chevalier, *Paris*, 1871.
Dr. J. Léon Soubeiran, *Montpellier*, 1871.
Dr. Augustin A. Délondre, *Sèvres*, 1871.
Stanislas Martin, *Paris*, 1872.
Dr. G. Planchon, *Paris*, 1877.

GERMANY.

Dr. Adolph Duflos, *Breslau*, 1871.
Dr. Hermann Hager, *Pulvermühle bei Fürstenberg*, 1868.
Dr. F. A. Flückiger, *Strassburg*, 1868.
Dr. Frederick Mohr, *Bonn*, 1868.
L. A. Wiggers, *Göttingen*, 1877.
Dr. G. C. Wittstein, *Munich*, 1868.

GREECE.

Xaver Landerer, 1877.

NETHERLANDS.

Dr. J. E. De Vrij, *Hague*, 1871.

RUSSIA.

Dr. G. Dragendorff, *Dorpat*, 1868.

SWITZERLAND.

Dr. Edward Schaer, *Zurich*, 1877.

ACTIVE MEMBERS.

☞ Members are requested to report any inaccuracies in these lists, and to notify the Secretary and Treasurer of all changes of address.

(The names of life members in SMALL CAPITALS. Names of life members under the old Constitution in *italics*.)

UNITED STATES OF AMERICA.

ALABAMA.

Mobile.

Candidus, Philip Charles,	1857
Hawkins, Joseph T.,	1878
Mohr, Charles,	1871
Moore, Thomas F.,	1878
Punch, William F.,	1874

CALIFORNIA.

San Francisco.

Calvert, John,	1870
Moffit, Thomas S.,	1861
Painter, Emlen,	1870
Runyan, Edward W.,	1875
Simpson, William,	1870
Steele, Henry,	1859
Steele, James G.,	1859
Wenzell, William T.,	1870

Eureka, Hulmboldt Bay.

McKay, George Johnson,	1864

Marysville, Yuba Co.

Flint, John Henry,	1873

Oakland.

Brown, Joseph John,	1876

San Jose.

Wagener, Samuel Hopkins,	1869

Santa Barbara.

Finger, Henry J.,	1878

Vallejo, Solano Co.

Frost, James,	1870
Topley, James,	1869

COLORADO.

Central City.

Best, John,	1866

COLUMBIA, DISTRICT OF.

Georgetown.

Becker, Charles,	1875

Washington.

Baldus, William Theodore,	1872
Bannvart, Charles A.,	1856
Berrian, George W., Jr.,	1857
Bury, Edward Berkley,	1870
Christiani, Charles,	1874
Christiani, Theodore,	1873
Cromwell, Zachariah William,	1870
Drew, John Waters,	1876
Duckett, Walter G.,	1876
Dufour, Clarence Reuter,	1876
Entwisle, William Burton,	1873
Ferguson, Robert Benedict,	1867
Heller, Peter Henry,	1871
Hickling, Daniel Percy,	1867
Kidwell, John Lawrence,	1856
Knabe, Gustavus Alexander,	1876
Lewis, Samuel Edwin,	1875
Major, John Richards,	1873
Milburn, John Alexander,	1858
O'Donnell, James Dominic,	1870
Oldberg, Oscar,	1873
Price, Charles Satchel,	1876
Reinlein, Paul,	1856
Scala, William Franklin,	1876
Schafhirt, Adolph Julian,	1876
Simms, Giles Green Craycroft,	1860
Taber, Edward Morris,	1874

Thompson, William Scott,	1871
Tyson, Samuel Ellicott,	1857

CONNECTICUT.

Hartford.

Goodrich, Stephen,	1875
Goodwin, Lester Henry,	1875
Rapelye, Charles Andrew,	1876
Wells, John C.,	1875
Williams, John Kirby,	1875

Danbury.

Perry, Frank Vinton,	1876

Litchfield.

Gates, Howard Eugene,	1873

Middletown.

Pitt, John Richard, Jr.,	1872

Naugatuck.

May, James Oscar,	1875

New Britain.

Main, Thomas Francis,	1872

New Haven.

Dimock, Robert Hemphill,	1876
Gessner, Emil A.,	1878
Kelsey, Henry, Jr.,	1873
Spalding, Warren Alphonso,	1876
Wells, Romanta,	1877
Wood, Alonzo Felton,	1876

Norwich.

Osgood, Hugh Henry,	1875
Sevin, Nathan Douglass,	1875

Stamford.

Haight, William Bogardus,	1872
Morrison, Samuel C.,	1871

Wallingford.

Pickford, Thomas,	1875

Waterbury.

Dikeman, Nathan,	1859
Munson, Luzerne Ithiel,	1872
Wilcox, Frederick,	1878
Woodruff, Roderick Samuel,	1876

West Winsted.

Phelps, Dwight,	1873

Winsted.

Renouff, James Theron,	1877

DELAWARE.

Wilmington.

Belt, Zedekiah James,	1876
McInall, Edward, Jr.,	1867
Smith, Linton,	1870

FLORIDA.

Fort George.

Rohrbach, Theodore,	1876
Rollins, John Francis,	1859

Jacksonville.

Hughes, Benjamin Longmore,	1878

Monticello.

Palmer, John Dabney,	1875

Waldo.

Wheeler, Lucian F.,	1858

GEORGIA.

Albany.

Welch, Leonard E.,	1878

Athens.

Brumby, Robert Trapier,	1878

Atlanta.

Avary, Archibald,	1878
Bradfield, L. H.,	1878
Candler, Asa Griggs,	1878
Daniels, John B.,	1871
Greene, Charles H.,	1878
Howarth, James L.,	1877
Peacock, Frederick S.,	1871
Pinson, John L.,	1878
Rankin, Jesse Willis,	1877
Reynolds, John J.,	1876
Schumann, Peter John,	1878
Schumann, Theodore,	1860
Taylor, Walter Adolphus,	1876

Augusta.

Hankinson, Thomas S.,	1878
Land, Robert Henry,	1859
Tarrant, Homer Post,	1875

Cartersville.

Curry, David W., . . . 1878

Cochran.

Morgan, Young Hiram, . . 1878

Cuthbert.

Stanford, James William, . 1878

Hawkinsville, Pulaski Co.

Ellis, William L. A., . . 1878
Fale, John, ... 1877

Macon.

Brunner, Norman Isaac, . . 1878
Hall, Roland Butler, . . 1877
Hunt, Leonard Washington, . 1878
Ingalls, John, ... 1876
Massenburg, Thomas Lowry, . 1878
Menard, Alexander Ambrose, . 1877

Milledgeville.

Clark, John Marin, . . . 1857
Grieve, Fleming Grantland, . 1859
Cotting, William Augustus, . 1869

Rome.

Fenner, William Roane, . . 1871
Turnley, Pryor Lee, . . 1878

Savannah.

Butler, Osceola, . . . 1878
Yonge, St. John R., . . 1878

ILLINOIS.

Bloomington.

Dyson, Dunbar Smith, . . 1856

Bradford, Stark Co.

Plummer, David Graham, . 1869

Chicago.

Bartlett, Nicholas Gray, . . 1864
Biroth, Henry, ... 1865
Blocki, William Frederick, . 1863
Borland, Matthew Wilson, . 1876
Buck, George, ... 1860
Ebert, Albert Ethelbert, . . 1864
Fischer, Edward J., . . . 1875
Fox, Daniel S., . . . 1872
Fredigke, Charles Christian, . 1869
Fuller, Henry Weld, . . 1865
Fuller, Oliver Franklin, . . 1869
Gale, Edwin Oscar, . . . 1857
Gale, William Henry, . . 1857
Garrison, Herod Daily, . . 1869
Heuermann, Henry William, . 1869
Hogan, Louis Cass, . . . 1876
Hooper, John H., . . . 1865
Jacobus, Judson Schradlow, . 1870
Jauncey, William, . . . 1873
Krusemarck, Charles, . . 1876
Mahla, Frederick, . . . 1864
McPherson, George, . . . 1865
Mill, James Wishart, . . 1864
Milleman, Philip Lionel, . . 1866
Palmer, Hosea W., . . . 1870
Parsons, John, ... 1865
Reinhold, William, . . . 1866
Sargent, Ezekiel Herbert, . 1864
Sharp, Joseph Perine, . . 1865
Strehl, Louis C., . . . 1866
Sweet, Henry, ... 1865
Vogeler, Adolph Gustav, . 1876
Wheeler, Charles Gilbert, . 1876
Whitfield, Thomas, . . . 1865
Wilson, Julius Henry, . . 1869
Woltersdorf, Louis, . . . 1865

Englewood, Cook Co.

Peirpoint, Newton, . . . 1869

Galesburg.

Clark, Albert Burr, Jr., . . 1868

Highland.

Mueller, Adolphus, . . . 1871

Mascoutah.

Henrich, George, . . . 1875

Peoria.

Singer, Peter Joseph, . . 1869

Quincy.

Schroder, Hermann, . . 1871

INDIANA.

Aurora.

Marshall, Hubert Joseph, . 1877

Indianapolis.

Dill, J. B.,	1878
Dryer, James Wilkinson,	1871
Kielhorn, Henry,	1874
Lilly, Eli,	1878
Martin, Emil,	1878
Schrader, Henry,	1869
Sloan, George White,	1857

Jeffersonville.

Loomis, John Clarence,	1876

Lawrenceburgh.

Ferris, Charles E.,	1874

Kendallville.

Lohman, George H.,	1872

Madison.

Harper, Frank Merritt,	1874

New Albany.

Conner, Jefferson Somerville,	1876
Scribner, Benjamin Franklin,	1858

Rushville.

Pugh, Finley Bigger,	1876

Tell City.

Schreiber, August,	1876

Terre Haute.

Buntin, William Campbell,	1874

IOWA.

Burlington.

Squires, Charles Park,	1876
Wigert, Carl Reinhold,	1876

Davenport.

Ballard, John Winthrop,	1871

Dubuque.

Ruete, Theodore William,	1870

Fort Dodge.

Oleson, Olaf Martin,	1877

Fort Madison.

Schaefer, George H.,	1871

Iowa City.

Boerner, Emil Louis,	1877

Monticello.

Tiarks, Hermann,	1876

Washington.

Ink, Parker P.,	1872

KANSAS.

Lawrence.

Leis, George,	1869

Leavenworth.

Harrop, Joseph,	1869

KENTUCKY.

Bowling Green.

Burge, J. O.,	1878

Cattlesburg.

Patton, William Allison,	1873

Covington.

Zwick, George Gilbert,	1874

Frankfort.

Averill, William Henry,	1874

Harrodsburg, Mercer Co.

Abell, Russell,	1878

Hopkinsville.

Gray, Francis Marion,	1876

Lexington.

Frost, John Johnson,	1874
Richardson, Marcus D.,	1874

Louisville.

Bell, Gotthard Emanuel,	1874
Colgan, John,	1867
Davis, Vincent,	1874
Diehl, Conrad Lewis,	1863
Huddart, John Fletcher,	1870
Jones, Simon Newton,	1870
Lingelbach, Ferdinand,	1874
McAfee, James Alexander,	1874

Miller, Frederick Christopher,	1874
Newman, George Abner, . .	1866
Pfingst, Edward Charles, . .	1874
Pfingst, Ferdinand John, .	1867
Pfingst, Henry Adolph, . .	1874
Rogers, Wiley, . . .	1874
Scheffer, Emil, ...	1872
Strassel, William, . . .	1870
Sutton, Peter Priest, . .	1871
Wilder, Graham, . . .	1868

Maysville.

Blattermann, George W., .	1876

Nicholasville.

Oxley, Jefferson, . . .	1878

Shelbyville.

McKenney, Jesse Fisher, . .	1878

LOUISIANA.

New Orleans.

Flemmich, Doric Ball, . .	1877
Genois, Louis, ...	1876
Girling, Robert Nast, . .	1876
Keffer, William P., . . .	1866
Lyons, Isaac Luria, . . .	1875
Thompson, Thomas Charles, .	1876

Bayou Goula.

Viallon, Paul L., . . .	1870

Gretna.

Langebecker, Charles Oscar, .	1876

New Iberia.

Lee, James Augustin, . .	1856

Plaquemine.

Delavallade, John M., . .	1873

Thibodeaux.

Thibodeaux, Joseph Theogine,	1870

Vidalia.

Schaaf, Justis Henry, . .	1875

MAINE.

Augusta.

Partridge, Charles Kimball, .	1867

Bangor.

Harlow, Noah Sparhawk, .	1859
Patten, John Frederic, . .	1871

Bath.

Anderson, Samuel, . . .	1876

Belfast.

Moody, Richard Henry, . .	1876

Biddeford.

Boynton, Herschell, . . .	1875

Eastport.

Shead, Edward Edes, . .	1866

Ellsworth.

Parcher, George Asa, . .	1875

Lewiston.

Wakefield, Seth Davis, . .	1875

Portland.

Cummings, Henry Thornton, .	1853
Dana, Edmund, Jr., . .	1877
Hay, Henry Homer, . .	1867
Jordan, William Henry, . .	1871
Perkins, Benjamin A., . .	1878
Phillips, Walter Fiske, . .	1859
Preston, Alfred, Jr., . .	1873

Richmond.

Donnell, J. Woodbury, . .	1875

Searsport.

Curtis, Lebbens, . . .	1875

Waterville.

Plaisted, James H., . . .	1875

Yarmouth.

Richardson, James Hamilton, .	1868

MARYLAND.

Baltimore.

Baxley, Jackson Brown, . .	1856

Beam, Isaac Richard,	1873
Brack, Charles,	1876
Brown, Alexander Ellis,	1863
Brown, William Henry,	1863
Dohme, Charles Emile,	1863
Dohme, Lewis,	1859
Donavin, Matthew Watson,	1867
Eareckson, Edwin,	1875
Elliott, Henry Alexander,	1859
Emich, Columbus Valentine,	1863
Frames, James Parker,	1868
Gosman, Adam John,	1870
Hancock, John Francis,	1863
Hassencamp, Ferdinand,	1872
Jackson, Vincent Rodman,	1876
Jefferson, John Henry Bailey,	1868
Jennings, Nathaniel Hynson,	1857
Lauer, Michael John,	1865
Lautenbach, Robert,	1870
Lilly, Alonzo, Jr.,	1863
Mittnacht, Henry,	1873
Monsarrat, Oscar,	1856
Moore, Jacob Faris,	1856
Morrison, John Ellwood,	1863
Muth, John Philip,	1864
Osburn, William Henry,	1870
Perkins, Elisha Henry,	1857
Roberts, Joseph,	1856
Russell, Eugene Janus,	1856
Russell, Edward Walton,	1863
Sappington, Richard,	1870
Sharp, Alpheus Phineas,	1855
Thienemann, Charles,	1876
Thompson, William Silver,	1856
Thompson, William Partlow,	1874
Thomsen, John Jacob,	1856
Tilyard, Charles Slade,	1867
Webb, John Alansen,	1870
Winkleman, John Henry,	1864
Woodward, Samuel Morris,	1874

Annapolis.

Button, Elijah,	1870

Cumberland.

Hermann, J. George,	1878
Shriver, Henry,	1876
Shryer, Thomas Wilson,	1875

Frederick City.

Schley, Steiner,	1878

Hagerstown.

Winter, Jonas,	1863

MASSACHUSETTS.

Boston.

Babcock, James Francis,	1875
Babo, Leopold,	1859
Barry, Daniel Edward,	1875
Bartlett, William Williams,	1875
Bassett, Charles Harrison,	1867
Bolles, William,	1875
Boyden, Edward Cleveland,	1874
Brown, Joseph Taylor,	1859
Brown, Joseph Taylor, Jr.,	1869
Burley, Edward Porter,	1877
Burnett, Joseph,	1852
Campbell, Isaac Towle,	1859
Canning, Henry,	1865
Carter, Solomon,	1865
Colcord, Samuel Marshall,	1852
Colton, James Byers,	1865
Covell, Thomas Jefferson,	1864
Craig, John Smith,	1875
Cutler, Edward Waldo,	1859
Doliber, Thomas,	1859
Doolittle, Erastus Hubbard,	1865
Drury, Linus Dana,	1871
Eaton, Charles Irving,	1867
Folger, William Swain,	1875
Fowle, Henry Dearborn,	1853
French, George Washington,	1865
Fuller, Sumner Howard,	1875
Gilman, Samuel Kinsman, Jr.,	1876
Gleeson, James Andrew,	1859
Gleeson, Michael Henry,	1859
Godding, John Granville,	1875
Hoagland, Pratt Ralph,	1868
Horton, William Francis,	1869
Hoyt, George Melvin,	1875
Jenkins, Luther Lincoln,	1867
Jenks, Thomas Leighton,	1875
Jones, James Taber,	1875
Kelly, Edward Samuel,	1871

Kent, Robert Restieux,	1855
Leary, Jeremiah Thomas,	1869
Lincoln, Henry Ware,	1853
Littlefield, Alvah,	1856
Lowd, John Colby,	1871
Markoe, Geo. Frederick Holmes,	1863
Melvin, James Samuel,	1853
Metcalf, Theodore,	1857
Nowell, William Frederick,	1867
O'Brien, James John,	1875
Parker, Joseph Lyman,	1864
Patch, Edgar Leonard,	1872
Patten, Ichabod Bartlett,	1858
Restieaux, Thomas,	1853
Ricker, George Dexter,	1858
Sears, George Thomas,	1875
Sewall, David Jewett,	1875
Sharples, Stephen Paschell,	1875
Sheppard, Samuel Airus D.,	1865
Simson, Francis Cook,	1876
Smalley, Elijah,	1860
Smith, Albert Calvin,	1875
Snow, Jesse Walker,	1875
Stoddard, George Howland,	1877
Stowell, Daniel,	1875
Talbot, James Stewart,	1873
Tompkins, Orlando,	1859
Tower, Levi, Jr.,	1860
Trask, Charles Mitchell,	1875
Turner, Thompson Larkin,	1853
Underwood, Charles Gordsford,	1865
Warren, George Washington,	1875
Webster, Stephen,	1875
Wilkins, Daniel Gilbert,	1865
Wilson, Benjamin Osgood,	1859
Winslow, Samuel W.,	1875
Woodbridge, George Washington,	1859
Wright, William Raith,	1875

Andover.

Parker, George Hawkins,	1874

Cambridge.

Hubbard, John Henry,	1866
James, Thomas Potts,	1857

Cambridgeport.

Bayley, Augustus Ramsey,	1859
Danforth, Edmund Culver,	1878
Orne, Joel Stone,	1859
Orne, Charles Parker,	1874
Thayer, Henry,	1858

Charlestown.

Kettell, George Parker,	1867
Marshall, Ernest Clifton,	1875
Stacey, Benjamin Franklin,	1860

Chelsea.

Buck, John,	1855

Clinton.

Holden, Henry Clay,	1870

Danvers.

Merrill, Walter Stanley,	1875

Dorchester.

Prescott, Horace Augustus,	1875

East Cambridge.

Stackpole, Harry H.,	1878

Fall River.

Redfearn, John,	1873

Fitchburg.

Choate, John,	1877

Great Barrington.

Lillie, Charles,	1875
Morgan, Richard Evan,	1875
Whiting, Frederick Theodore,	1863

Haverhill.

Frothingham, Edward Gilman, Jr.,	1875

Hingham.

Hunt, James Lewis,	1865

Hinsdale.

Plummer, George Bolton,	1875

Holyoke.

Wild, Joseph Oscar,	1873

Lawrence.

Whitney, Henry Martyn,	1859

Lowell.

Bailey, Frederick,	1869
Butler, Freeman Hall,	1874
Hood, Charles Ira,	1871
Kidder, Samuel, Jr.,	1859

Lynn.

Gordon, Edward Bertelle,	1875
Proctor, Benjamin,	1859
Tozzer, Samuel Clarence,	1875

Medford.

Brigham, William Cleveland,	1877
Clough, Thomas Reed,	1875
Howard, Daniel Newbury,	1877

Middleboro.

Drake, Charles William,	1873

Milford.

Rice, John Allen,	1875

Monson.

Phipps, John Mellen,	1875

Nantucket.

Jagger, Charles Henry,	1875

Natick.

Daniels, Samuel Olney,	1875

New Bedford.

Blake, James Edwin,	1866
Hadley, Frank Rufus,	1872
Lawton, Charles Henry,	1873
Lawton, Horace Allen,	1873
Shurtleff, Israel Hammond,	1875
Taylor, John Pitman,	1875

Newburyport.

Atkinson, Albert Johnson,	1875

Newton Centre.

Noble, John Joseph,	1875

North Adams.

Griswold, William Henry,	1874

Pittsfield.

Atwood, Luther Lee,	1876

Quincy.

Whall, Joseph Stokes,	1873

Rockland.

Denham, Charles Sumner,	1875
Easton, Luther Waite,	1875
Estes, Joseph Joselyn,	1870

Rockport.

Blatchford, Eben,	1857

Salem.

Nichols, Thomas Boyden,	1876

Shelbourne Falls.

Baker, Edwin,	1875

Somerville.

Cowdin, George Henry,	1875
Flanagan, Lewis Cass,	1875

Springfield.

Alden, Charles Packard,	1874
Ferree, Henry D.,	1875
Gray, William H.,	1877
Webber, Joseph Terrance,	1873

Taunton.

Marvel, Amos Francis,	1875

Warren.

Harwood, Frank Lucian,	1875
Harwood, Lucian,	1875

Worcester.

Burkbank, George C.,	1875
Bush, William,	1875
Fairbanks, Harlan,	1876
McConville, Thomas Aloysius,	1864
Scott, Nelson Ryan,	1859
Willard, William Henry,	1875

MICHIGAN.

Ann Arbor.

Eberbach, Ottmar,	1869
Prescott, Albert Benjamin,	1871

Battle Creek.

Wardell, Robert C.,	1860

Detroit.

Caldwell, James William,	1875
Holt, Alvin Everett,	1873
Johnston, William,	1860
Ronnefeld, Theodore,	1866
Somers, Frank Giddings,	1877
Vernor, James,	1866

East Saginaw.

Dunk, Alfred Allen,	1867
Garrigues, Samuel Smith,	1855
Melchers, Henry,	1869

Jackson.

Austin, George Wesley,	1865

Kalamazoo.

MacDonald, George,	1871

Monroe.

Sackett, Samuel M.,	1876

Saginaw City.

Keeler, William Henry,	1872
Moll, William,	1869

Schoolcraft.

James, George Riley,	1869

Ypsilanti.

Morgan, James,	1859

MINNESOTA.

St. Paul.

Sweeney, Robert Ormsby,	1866

MISSISSIPPI.

Bay St. Louis.

Deléry, Edgar,	1878

Jackson.

Ash, Matthew Franklin,	1856
Buck, John Thomas,	1868

MISSOURI.

St. Louis.

Ahlbrandt, Henry Ernst,	1877
Alexander, Maurice William,	1871
Bang, Charles,	1871
Blank, Alois,	1871
Boehm, Solomon,	1871
Catlin, Ephron,	1871
Catlin, Theron,	1871
Chamberlain, Guilford Tracy,	1853
Cherot, Leonce,	1865
Crawford, William Harper,	1864
Crawley, Francis Xavier,	1869
Curtman, Charles Otto,	1871
D'Amour, Otto,	1871
Drake, Robert Samuel,	1878
Glenn, Thomas Smith,	1870
Good, James Machann,	1871
Grandjean, Charles,	1871
Grandjean, Eugene,	1871
Jones, Charles Kendall,	1867
Kalb, Theodore,	1864
Kirkbride, Joseph Cooper,	1869
Klie, G. H. Charles,	1878
Krebs, Hugo,	1871
Leitch, Arthur,	1860
Mallinckrodt, Edward,	1869
Meyer, Christian Fred'k Gottlieb,	1860
O'Gallagher, James,	1858
Pfeiffer, Adolph,	1876
Physick, Henry Sanford,	1870
Primm, Hubert,	1855
Richardson, J. Clifford,	1871
Sander, Enno,	1858
Scheffer, Henry William,	1863
Scholz, Philip,	1871
Sennewald, Ferdinand William,	1865
Tomfohrde, John William,	1878
Ude, George,	1871
Vardick, August Henry,	1874
Williamson, Edward John,	1876
Witte, Louis Edward,	1871

Chillicothe.

Boyce, Samuel F.,	1871

Kansas City.

Brackett, Aurick S.,	1868
Ford, William Thomas,	1878

Macon.

Field, Amos,	1871

Mexico, Adrian Co.

Llewellyn, John Frederick,	1867

Trenton.

Featherston'h, Edward R.,	1871

Weston.

Parr, John Conrad,	1856

NEBRASKA.

Omaha.

Goodman, Charles Frederick,	1871

NEVADA.

Virginia City.

Perkins, William Alexander,	1869

NEW HAMPSHIRE.

Allentown.

Hildreth, Charles Francis.	1874

Concord.

Eastman, Charles Smith,	1874
Underhill, George Francis,	1874

Dover.

Pinkham, Alonzo Taylor,	1874
Rackley, Benjamin Franklin,	1874
Tufts, Charles Augustus,	1856
Vickery, William Henry,	1874

Exeter.

Merrill, Charles A.,	1858

Keene.

Appleton, George Josephus,	1873

Lancaster.

Colby, Frank A.,	1876
Noyes, Parker Jewett,	1874

Littleton.

Morrill, Benjamin,	1876

Manchester.

Miville, Francis Charles,	1877
Perry, Bayard Taylor,	1876

Nashua.

Russell, Elias Smith,	1875
Whitman, Nelson Samuel,	1875

New Market.

Dearborn, George Luther,	1853

Portsmouth.

Marvin, Thomas Ellison Oliver,	1875
Thacher, Joseph Haven,	1859

Rochester.

Hanson, Dominicus,	1878
Shaw, Stephen F.,	1876

Somersworth.

Jones, Charles Mortimer,	1869
Moore, George,	1859
Wingate, Jeremiah Young,	1875

NEW JERSEY.

Bloomfield.

Scherff, John Philip,	1877

Burlington.

Vandegrift, John A.,	1867

Camden.

Brown, Albert Potts,	1870
Cochran, Samuel Wash,	1876
Lee, Emmor Hunt,	1875
Sommers, Richard Miller,	1876
Test, Alfred William,	1870

East Orange.

Rumsey, Samuel Louis,	1876

Elizabeth.

Barnaby, Thomas J.,	1870
Drake, Jonathan Baker,	1875
Oliver, William Murray,	1875

Elizabethport.

Frohwein, Richard,	1867

Hoboken.

Klussman, Hermann,	1876

Jersey City.

Abernethy, Maxwell,	1865
Dougherty, Samuel Edward,	1875
Finlay, Norman James,	1875
Laird, William Rudolph,	1867
Levering, Perry Wharton,	1876
Mercein, James Randolph,	1865
Pauly, Christian,	1875
Wienges, Conrad,	1875

Moorestown.

Worthington, Jeremiah Willits,	1873

Morristown.

Carrell, Eugene Ayers,	1875
Dalrymple, Charles Hoagland,	1860
McCarty, William,	1873

Mount Holly.

Miller, Louis,	1874
White, Aaron Smith,	1860

Newark.

Bruguier, Francis,	1876
Dreher, Ernest,	1869
Holzhauer, Charles,	1873
Nichols, Edward Payson,	1870
Peters, Alexander Chase,	1868
Sayre, William Henry,	1877
Smith, Charles Bradley,	1868
Smith, Israel Preston,	1876
Stamford, William Harrison,	1876
Townley, William Mattison,	1875
Vandervoord, Ransford Wells,	1870
Van Gieson, Theron Watts,	1869
Van Winkle, Abraham,	1871

New Brunswick.

Rust, William,	1870

Orange.

Harlow, Wickham Newman,	1874
Parsons, Robert Edwin,	1877

Plainfield.

Reynolds, Howard Prescott,	1875
Shaw, Robert Johnston,	1875
Vorhees, William Henry,	1868

South Amboy.

Jacques, George Washington,	1869

Trenton.

Mangold, Gustavus Adolph,	1875
Rickey, Randal,	1870

NEW YORK.

New York City.

Alsdorf, John,	1872
Ambler, Starr Hoyt,	1876
Atwood, Herman White,	1873
Balluff, Paul,	1860
Balser, Gustavus,	1875
Bedford, Peter Wendover,	1859
Billings, Henry Merry,	1869
Bischof, Albert Sigismund,	1875
Bond, Joseph Romulus,	1876
Buehler, Edward Handy,	1874
Burdge, Jacob U.,	1876
Campbell, Horace Willard,	1875
Carle, John, Jr.,	1860
Cassebeer, Henry Anthony,	1858
Cassebeer, Henry Adolphus,	1872
Chandler, Charles Frederic,	1867
Close, Eldridge William,	1874
Cohen, Louis S.,	1877
Cole, Theodore,	1873
Creuse, Jules L. A.,	1871
Currie, John Harper,	1858
Davis, Benjamin,	1869
Day, Walter De Forrest,	1873
Dege, George Frederick,	1868
Ditman, Andrew J.,	1868
Dung, Albert Charles,	1872
Eimer, Charles,	1872
Faber, John,	1857
Fairchild, Benjamin Thomas,	1875
Fisher, William,	1862
Fraser, Edward A.,	1873
Frey, John,	1865
Fougera, Edmund Charles,	1867
Frohwein, Theobald,	1862
Gardiner, Warren B.,	1860
Gardner Robert Winthrop,	1872
Gilmore, John Wesley,	1867
Gellatly William Adams,	1858

Gridley, Junius,	1853
Griffith, William Henry,	1874
Hale, Frederick,	1855
Hancock, John Henry,	1870
Horner, James Munroe,	1867
Haviland, Henry,	1857
Hays, David,	1867
Hebberling, Gottfried,	1867
Henes, William Frederic,	1876
Higgins, James Starkey,	1862
Hoffmann, Frederick,	1867
Hohenthal, Charles Frederic Leberecht,	1865
Hudnut, Alexander,	1857
Imhoff, Henry,	1872
Inness, George,	1878
Jarrett, Henry Thomas,	1875
Johnson, Edward L.,	1860
Kalish, Julius,	1875
Kiersted, Henry T.,	1856
Kimmel, Henry,	1867
Krehbiel, Gustavus,	1865
Lazell, Lewis T.,	1858
Lehlbach, Paul Frederick,	1872
Lehn, Louis,	1874
Levy, Adolph,	1877
Macmahan, Thomas Jackson,	1871
Marsh, Edward H.,	1858
McIntyre, Byron F.,	1876
McIntyre, Ewen,	1873
McKesson, John, Jr.,	1867
Milhau, Edward Leon,	1858
Molwitz, Ernest,	1867
Morrison, Thomas Ormsby,	1876
Mortimer, William G.,	1877
Neergaard, William,	1859
Osmun, Charles A.,	1868
Peixotto, Moses Levi Maduro,	1869
Pfingsten, Gustavus,	1873
Ramsperger, Gustavus,	1860
Reichard, Frederick Alfred,	1871
Rice, Charles,	1870
Ricksecker, Theodore,	1875
Robbins, Charles Albert,	1876
Robbins, Daniel C,	1862
Royce, Lucien Merriam,	1866
Sands, George Gedney,	1867
Scofield, James Stephen,	1867
Seabury, George J.,	1876
Seward, Daniel W.,	1874
Sheddon, John William,	1859
Sheils, George E.,	1860
Skelly, James Joseph,	1866
Starr, Thomas,	1870
Tscheppe, Adolph,	1876
Wanier, George Simon,	1876
Weaver, James,	1860
Weinman, Oscar Christian,	1873
Weismann, Augustus William,	1869
Wellcome, Henry Solomon,	1875
Wenck, George John,	1869
Westerfield, Joseph H.,	1858
White, Philip Augustus,	1872
Wickham, William Hull,	1870
Wilson, William,	1876
Zellhoefer, George,	1876

Brooklyn.

Althans, Charles Henry,	1873
Barnaby, James Otis,	1870
Bassett, Francis M.,	1860
Benjamin, James H.,	1878
Booth, Clarence Frederick,	1875
Chadwick, Alexander Baker,	1872
Close, George Cassidy,	1858
Curtiss, Charles Grenville,	1866
Cutts, Foxwell Curtis, Jr.,	1875
Day, Carlos Erastus,	1870
Daycock, William Henry,	1874
Dennin, Charles,	1875
Douglass, Henry, Jr.,	1875
Dudley, Oscar E.,	1877
Dunn, John Augustus,	1867
Dupuy, Eugene,	1852
Heydenreich, Emile,	1867
Heydenreich, Frederic Victor,	1860
Jones, Thomas,	1868
Kitchen, Charles William,	1865
Krieger, Philip,	1876
Lawlor, Charles Johnson,	1874
Lewis, Thomas,	1867
Livingston, Borent Van Buren,	1872
McElhenie, Thomas Diamond,	1872

Menninger, Henry Joseph,	1866
Newman, George Anthony,	1865
Nicot, Louis Edgar,	1875
Niebrugge, John August,	1861
Nietsch, Adolph Frederick William,	1872
Ollif, James Henry,	1867
Owens, Richard J.,	1860
Pyle, Cyrus,	1859
Raas, Francis,	1877
Rideout, James William,	1875
Sayre, Edward Augustus,	1877
Snyder, Ambrose Chancellor,	1867
Squibb, Edward R.,	1858
Tartis, Alfred Joseph,	1867
Ubert, Julius,	1876
Vincent, William,	1870
Wendler, Robert,	1876
Wynn, William,	1867

Albany.

Welch, Leonard E.,	1878

Angola, Erie Co.

Oatman, Le Roy Sunderland,	1872

Buffalo.

Peabody, William Huntington,	1857
Rano, Charles Orlando,	1866
Tibbs, William Henry,	1871

Elmira.

Holmes, Clay W.,	1876

Fishkill on Hudson.

Moith, Augustus Theodore,	1860

Flushing.

Hepburn, John,	1873

Geddes, Onondaga Co.

Belden, James Lester,	1874

Luzerne, Warren Co.

Miller, George Yerrington,	1872

Middletown.

King, James Theodore,	1859
Rogers, William Henry,	1869

Mount Vernon.

Gill, George,	1872

New Lebanon.

Tilden, Henry Augustus,	1858

Niagara Falls.

Griffith, Hiram Elijah,	1875

Norwich.

Torrey, Charles Edward,	1876

Plattsburgh.

Cady, Hiram Walworth,	1870

Port Chester.

Hyler, William Henry,	1875

Port Jervis.

Cook, George Edward,	1872

Potsdam.

Thatcher, Harvey Dexter,	1865

Poughkeepsie.

Brown, George Richard,	1876
Green, Thomas Townsend,	1858
Sherwood, Hezekiah,	1870

Rochester.

Haas, George Herman,	1872
Lane, Alfred Samuel,	1857
Paine, James Dixon,	1857

Rome.

Bissell, John Gordon,	1875
Broughton, Albert James,	1876

Rondout.

Laycock, Washington,	1857

Sag Harbor.

Lobstein, Jacob Fred. Daniel,	1868

Saratoga Springs.

Fish, Charles Frederic,	1866
Gates, Burt Pike,	1877
Gates, Carroll Eugene,	1877
Mingay, James,	1873

Pennington, Thomas Henry Sands,	1877

Spencerport.

Milliner, William Seward,	1877

Syracuse.

Dawson, Edward Seymour, Jr.,	1876
Snow, Charles Wesley,	1876

Tompkinsville, L. I.

Basset, John William,	1875

Troy.

Knowlson, Alexander Masterton,	1875
Sliter, Albert Hamilton,	1875

Utica.

Ballard, George Shepard,	1874
Howarth, John William,	1874

Yonkers.

Toplis, Robert John,	1863

NORTH CAROLINA.

Beaufort.

Mace, F. Borden,	1878

Chapel Hill.

Saunders, Richard B.,	1858

Charlotte.

Smith, Thomas C.,	1876

Fayetteville.

Hinsdale, Samuel Johnston,	1875

Raleigh.

Lee, Addison Sherwin,	1873
Simpson, William,	1873

Tarboro.

Zoeller, E. V.,	1878

Washington.

Gallagher, Charles Kewell,	1857

Wilmington.

Munds, James C.,	1878

OHIO.

Cincinnati.

Bain, Andrew Watson,	1874
Eger, George,	1864
Feemster, Joseph Hall,	1873
Fennel, Adolphus,	1864
Gordon, William John Maclester,	1854
Greve, Theodore Lund August,	1864
Heinemann, Otto,	1864
Helman, Charles Martin,	1864
Hill, Alfred Charles,	1864
Hottendorf Augustus,	1864
Judge, John French,	1866
Koehnken, Herman Henry,	1875
Keeshan, John,	1864
Lloyd, John Uri,	1870
Merrell, William Stanley,	1854
Rendigs, Charles Peter,	1876
Reum, Herman Frank,	1864
Schwab, Louis,	1876
Wagner, Henry,	1876
Wayne, Edward S.,	1854
Wells, Jacob David,	1864
Yorston, Matthew Mackay,	1864

Akron.

Armstrong, Andrew Moorehouse,	1876
Foltz, William Kean,	1872
Smith, Joseph S.,	1878

Alliance.

Barr, Peter Herbruck,	1867

Bryan.

Snyder, Alva Leach,	1873

Chillicothe.

Howson, Walter Henry,	1875

Circleville.

Fickardt, George Hunter,	1864

Cleveland.

Gaylord, Henry Cleveland,	1869
Hartness, William Henry,	1872
Hopp, Lewis C.,	1876
Huling, Bruce,	1872
Mayell, Alfred,	1872
Moore, James Penn,	1872
Scott, William Johnson,	1872

Spenzer, Peter Ignatius, .	1872
Vaupel, Charles Peter,	1872

Columbus.

Huston, Charles,	1872
Ritson, Alfred, .	1870

Fredericktown.

Jefferson, William E.,	1875

Ironton.

Ball, Theophilus Benedict,	1874

Logan.

Harrington, Frank, .	1869

Mansfield.

Miller, Charles Meyer,	1878

Massillon.

Baltzly, Zachariah Taylor,	1876

Middletown.

Johnson, Charles Brayton,	1876

Navarre.

Grossklaus, John Ferdinand,	1859

Salem, Columbiana Co.

Hawkins, Michael Smith,	1870
Kuhn, Norman A., .	1878

Sandusky.

Graham, William A.,	1876

South Charleston.

Armstrong, George Revington,	1877

Springfield.

Casper, Thomas Jefferson,	1867
Ludlow, Charles,	1872
Smith, Charles August, .	1874
Stout, William Andrew, .	1875

Toledo.

Hohley, Charles,	1872

Wooster.

Ohliger, Lewis Philip,	1871

Zanesville.

Hatton, Edgar Melville, .	1878

OREGON.

Portland.

Hodge, Charles,	1859
Sitton, Charles Edward, .	1878

PENNSYLVANIA.

Philadelphia.

Abell, Walter B.,	1867
Angney, John R.,	1867
Bakes, William Courtney,	1864
Bauer, Louis Gustavus, .	1867
Biddle, Charles Johnson, .	1875
Blair, Andrew,	1865
Blair, Henry Cowen,	1868
Blinkkorn, George, .	1860
Borell, Henry Augustus, .	1874
Boring, Edwin McCurdy,	1867
Bossler, David Jervis,	1873
Bower, Henry, .	1860
Bower, Henry Albert,	1868
Bowker, James,	1876
Bullock, Charles,	1857
Bunting, Samuel Sellers, .	1857
Burroughs, Silas Mainevielle, .	1876
Campbell, Hugh,	1876
Campbell, Samuel, .	1864
Cook, Thomas Penrose, .	1877
Coombe, Thomas Roberson,	1860
Cramer, Henry,	1867
Dobbins, Edward Tompkins,	1867
Eberle, Charles Louis,	1865
Eddy, Henry Clay, .	1869
Eldridge, George Washington,	1865
Ellis, Evan Tyson, .	1857
England, Robert,	1868
Erben, John Singer,	1868
Fox, Peter Paul,	1869
Früh, Carl D. S.,	1876
Gaillard, Edward, .	1876
Gerhard, Samuel,	1873
Grahame, Israel Janney, .	1856
Grove, John Eberly,	1868
Haenchen, Charles Eugene,	1865
Hance, Edward H., .	1857
Hancock, Charles West, .	1868

Hazlett, Edward Everett,	1876
Heintzelman, Joseph Augustus,	1858
Hurst, John Corry,	1868
Jenks, William J.,	1858
Johnson, Benjamin Franklin,	1859
Jones, Alexander Henry,	1874
Jones, Daniel Sexton,	1859
Jones, Edward Charles,	1864
Kay, Isaac Henry,	1870
Keasbey, Henry Griffith,	1873
Keeney, Caleb Reynolds,	1868
Keys, Roger,	1868
Kline, Mahlon Norwood,	1876
Koch, Louis,	1872
Krewson, William Egbert,	1875
Lindewald, Wilhelm Edvard,	1877
Lippincott, Henry Bascom,	1868
Magill, Benjamin Morris,	1876
Maisch, John M.,	1856
Mattern, William Kline,	1876
Mattison, Richard Vornselons,	1873
McIntyre, William,	1868
McKelway, George Irvin,	1874
Mellor, Alfred,	1864
Miller, Adolphus William,	1868
Milligan, Decatur,	1867
Mitchell, Charles Lippincott,	1874
Moore, Joachim Bonaparte,	1860
Moorhead, William Walker,	1876
Murray, Francis Marion,	1876
Needles, Caleb H.,	1868
Newbold, Thomas Mitchell,	1876
Ottinger, James Jeremiah,	1876
Parrish, Clemmons,	1868
Parrish, Dillwyn,	1857
Patterson, James Lemon,	1876
Perot, Thomas Morris,	1857
Pile, Wilson H.,	1857
Post, Elisha,	1876
Power, Frederick Belding,	1872
Preston, David,	1868
Procter, Wallace,	1874
Remington, Joseph Price,	1867
Riley, Charles William,	1868
Rittenhouse, Henry Norman,	1857
Robbins, Alonzo,	1865
Roche, Edward Manning,	1868
Roche, William Ford,	1868
Rosengarten, Mitchell George,	1869
Scattergood, George James,	1860
Selfridge, Matthew Merthirall,	1858
Shaw, Louis,	1877
Shivers, Charles,	1860
Shinn, James Thornton,	1860
Shoemaker, Joseph Leybrand,	1867
Shoemaker, Richard Martin,	1869
Shryock, Allen,	1868
Simpers, John Wilmer,	1874
Snowdon, George Miles,	1857
Spannagel, Charles Christian,	1874
Taylor, Alfred Bower,	1852
Taylor, Henry Burnes,	1876
Thompson, William Beatty,	1858
Trimble, Henry,	1876
Troth, Samuel Fothergill,	1857
Vogelbach, Hermann Augustus,	1868
Warner, William Richard,	1857
Warrington, Charles W.,	1876
Weaver, J. Thornton,	1868
Webb, William Barber,	1867
Weber, William,	1872
Weidemann, Charles Alexander,	1868
Wendel, Henry Edward,	1873
Wiegand, Thomas Snowdon,	1857
Wilder, Hans Matthias,	1866
Wilson, Adam Hill,	1859
Wright, Archibald Wesley,	1868
Zeilin, John Henry,	1859

Alleghany City.

Eggers, Frederick Hermann,	1872

Beaver, Beaver Co.

Andriessen, Hugo,	1875

Bethlehem.

Luckenback, Edward Hermann,	1870
Meyers, Edward Tobias,	1867

Carlisle.

Horn, Wilbur Fisk,	1876

Chambersburg.

Cressler, Charles Henry,	1868

Columbia.

Meyers, James Alfred,	1867

Danville.

Sechler, James C., . . . 1878

Easton.

Weaver, John Archibald, . 1873

Erie.

Nick, William Frederick, Jr., 1869

Harrisburg.

Finney, Thomas Jefferson, . 1874
George, Charles Theodore, . 1873
Miller, Jacob Augustus, . . 1873

Hyde Park, Luzerne Co.

Morgan, Benjamin George, . 1876

Lancaster.

Heinitsh, Charles Augustus, . 1857

Lebanon.

Karch, Joseph Jacob, . . 1876
Lemberger, Joseph Lyon, . 1858
Ross, George, ... 1878

Lewisburg, Union Co.

Schaffle, Samuel Wilson Wykoff, 1876

Marietta.

Wike, Albert Davis, . . 1876

Minersville.

Burns, John Kellar, . . 1876

New Brighton.

Walker, F. W., Jr., . . 1878

Oil City.

Griffith, Albert Richard, . . 1870

Pittsburg.

Abel, Joseph, ... 1864
Cherry, James Bonbright, . 1868
Emanuel, Louis, . . . 1878
Holland, Samuel Smith, . . 1876
Hostetter, Charles Michael, . 1870
Kerr, James, Jr., . . . 1876

Pittston.

Rhoades, Stephen Howard, . . 1876

Pottsville.

Kennedy, George Washington, 1869

Quakertown.

Penrose, Stephen F., . . 1871

Reading.

Raser, John Bernard, . . 1872
Stein, Jacob Henry, . . . 1869
Ziegler, Philip Milton, . . 1867

Sharon, Mercer Co.

Dame, Samuel Page, . . 1876

Tamaqua.

Albrecht, Emil, . . . 1875

West Chester.

Evans, Joseph Spragg, . . 1877

Wilkesbarre.

Wolfe, Nathaniel, . . . 1878

Williamsport.

Cornell, Edward Augustus, . 1873
Duble, Jesse Balderston, . . 1870

RHODE ISLAND.

East Greenwich.

Congdon, Albert James, . . 1860

Newport.

Blackman, Lyman Rawson, . 1865
Cotton, William Henry, . . 1875
Frost, William Arthur, . . 1875
Taylor, James Henry, . . 1875

Providence.

Blanding, William Bullock, . 1875
Boutelle, William Eugene, . 1876
Calder, Albert Layton, . . 1859
Cone, John Wright, . . . 1876
Follansbee, Sherman, . . 1875
Hatch, Frederick Albert, . 1876
Mason, Norman Nelson, . . 1875
Reynolds, William Keyes, . 1876

Westerley.

Latimer, Robert Fulton, . . 1857

Wyoming.

Greene, George E.,	1875

SOUTH CAROLINA.

Aiken.

Harbers, William Henry,	1875

Charleston.

Burnham, Edward S.,	1874
Eckel, Augustus W.,	1874
Gibson, William Andrew,	1874
Luhn, Gustavus Johann,	1873
Michaelis, Charles Otto,	1874
Moise, Benjamin Franklin,	1876
Panknin, Charles Frederick,	1874

Columbia.

Heinitsh, Edward H.,	1877

TENNESSEE.

Bolivar.

Larwill, Joseph H., Jr.,	1858

Knoxville.

Albers, George William,	1872

Memphis.

Fahlen, James,	1876
Hoerner, Theodore,	1871
Robinson, James Scott,	1869
Safford, William Burr,	1875

Nashville.

Haddox, James Bowling,	1876
Laurent, Eugene L.,	1872
Thomas, James, Jr.,	1875
Wharton, John Criddle,	1872
Wharton, William Henry,	1876

TEXAS.

Austin.

Lindeman, Herman Ernst,	1878
Morley, William Jarman,	1876

Dallas.

Connor, Lewis Myers,	1874

Fort Worth.

Powell, Thomas Wallace,	1874
Wells, Ebenezer Miller,	1878

Galveston.

Voelcker, Rudolph,	1878

San Antonio.

Elbe, Constantine Berthold,	1877

Terrill.

Brown, Charles Scott,	1873

VERMONT.

Brandon.

Grossman, George Alvin,	1872

Burlington.

Van Patten, William James,	1876

Ludlow.

Sherman, Linus Etias,	1875

Rutland.

Higgins, Albert Warren,	1870
Lewis, Elam Clark,	1870

St. Johnsbury.

Bingham, Charles Calvin,	1875
Randall, George Dallas,	1875

Vergennes.

Young, John Edward,	1875

Windsor.

Paine, Milton Kendall,	1875

VIRGINIA.

Fredericksburg.

Hall, Marshall Carter,	1870

Harrisonburg.

Avis, James Little,	1873

Lynchburg.

Lumsden, Charles Harris,	1875
Strother, William Alexander,	1874

Norfolk.

Addington, William B.,	1878

Burgess, Edward,	1876
Masi, Frederick Henry,	1873
Underhill, Charles Francis,	1876

Petersburg.

Goodwyn, John W.,	1873

Richmond.

Anthony, Joseph,	1873
Baker, Thomas Roberts,	1873
Blunt, Ira Washington,	1873
Bodeker, Henry,	1873
Dupuy, Powhatan Eldridge,	1873
Meade, Richard Hardaway,	1873
Miller, Polk,	1876
Nesbitt, Charles Albert,	1873
Nolting, Adolphus William, Jr.,	1870
Purcell, John Barry,	1875
Scott, Albert Augustus,	1873
Scott, William Henry,	1873
Taliaferro, Edwin Conway,	1876
Willis, Joseph Norment,	1873

Unionville, Orange Co.

Chipman, Edward Dyer,	1872

WEST VIRGINIA.

Charlestown.

Boggs, Edwin Leslie,	1872

Wheeling.

Bocking, Edmund,	1874
Hartung, Hugo Rudolph,	1876
Young, Alexander Thomas,	1876

WISCONSIN.

Janesville.

Heimstreet, Edward Burton,	1874
Prentice, Frederick F.,	1876

Maxomanie.

Senier, Frederick S.,	1874

Milwaukee.

Drake, John Ransom,	1860
Schrank, Henry Charles,	1876

Pentwater.

Jesson, Jacob,	1872

Watertown.

Eberle, Herman Theodore,	1875

DOMINION OF CANADA.

QUEBEC.

Montreal.

Giroux, Edmond,	1878
Gray, Henry Robert,	1867
Lowden, John,	1875
Lyman, Benjamin,	1875
Lyman, Stephen Jones,	1875

ONTARIO.

Belleville.

Yeomans, Lewis Walbridge,	1876

Caledonia.

Walker, John Alfred,	1873

Goodrich.

Jordan, Frederick,	1877

Guelph.

Petrie, Alexander Bain,	1867

Lindsay.

Gregory, Edmund,	1875

London.

Bowman, James,	1876
Saunders, William,	1860
Williams, Joseph,	1875

Stratford.

Waugh, George James,	1862

Toronto

Elliott, William,	1877
Harvey, Edmund,	1877
Henderson, John,	1877

Hodgetts, George,	1877
Knowles, Harvey Armage,	1877
Lander, John Cambridge,	1877
Massey, George,	1877
Robinson, William Sherlock,	1877
Rose, Henry John,	1872
Shuttleworth, Edward Buckingham,	1877

BERMUDA.

Hamilton.

Heyl, James B.,	1863

U. S. OF COLOMBIA.

Panama.

Herbruger, Florence C.,	1867.

ALPHABETICAL LIST OF ACTIVE MEMBERS.

Abel, Joseph, cor. Fifth avenue and Grant street, Pittsburg, Pa.
Abell, Russell, Harrodsburg, Mercer County, Ky.
Abell, Walter B., cor. Frankford and Girard avenues, Philadelphia, Pa.
Abernethy, Maxwell, No. 188 Newark avenue, Jersey City, N. J.
Addington, William B., Norfolk, Va.
Ahlbrandt, Henry E., S. E. cor. Fifteenth and Cass streets, St. Louis, Mo.
Albers, George W., Market Square, Knoxville, Tenn.
Albrecht, Emil, Tamaqua, Pa.
Alden, Charles P., No. 270 Main street, Springfield, Mass.
Alexander, Maurice W., S. E. cor. Fourth and Market streets, St. Louis, Mo.
Alsdorf, John, No. 612 Tenth avenue, New York City, N. Y.
Althans, Charles H., No. 191 Fulton street, Brooklyn, N. Y.
Ambler, Starr Hoyt, No. 36 Vesey street, New York.
Anderson, Samuel, No. 48 Front street, Bath, Me.
Andriessen, Hugo, P. O. Box 39, Beaver, Beaver County, Pa.
Angney, John R., cor. Fifth and Spruce streets, Philadelphia, Pa.
Anthony, Joseph, No. 10 East Broad street, Richmond, Va.
Appleton, George J., P. O. Box 959, Keene, N. H.
Armstrong, Andrew M., No. 106 East Market street, Akron, O.
Armstrong, George R., South Charleston, O.
Ash, Matthew F., P. O. Box 129, Jackson, Miss.
Atkinson, Albert J., cor. State and Pleasant streets, Newburyport, Mass.
Atwood, Herman W., No. 856 Broadway, New York.
Atwood, Luther L., No. 7 North street, Pittsfield, Mass.
Austin, George W., No. 6 South Front street, Jackson, Mich.
Avary, Arch., Atlanta, Ga.
Averill, William H., Frankfort, Ky.
Avis, James L., near Masonic Temple, Harrisonburg, Va.
Babcock, James F., No. 10 Rollins street, Boston, Mass.
Babo, Leopold, No. 12 Boylston street, Boston, Mass.
Bailey, Frederick, P. O. Box 314, Lowell, Mass.
Bain, Andrew W., City Hospital, Cincinnati, O.
Baker, Edwin, Bridge street, Shelbourne Falls, O.
Baker, T. Roberts, No. 909 Main street, Richmond, Va.
Bakes, William C., corner Tenth and Arch streets, Philadelphia, Pa.
Baldus, William T., No. 1901 Pennsylvania avenue, Washington, D. C.

Ball, Theophilus B., No. 105 Second street, Ironton, O.

Ballard, George S., No. 198 Genesee street, Utica, N. Y.

Ballard, John W., No. 106 West Second street, Davenport, Iowa.

Balluff, Paul, No. 655 Sixth avenue, New York.

Balser, Gustavus, No. 137 Avenue B, New York.

Baltzly, Zacharias T., Opera Block, Massilon, O.

Bang, Charles, No. 1429 Franklin avenue, St. Louis, Mo.

Bannvart, Charles A., Treasury Department, Washington, D. C.

Barnaby, James O., No. 700 Fulton street, Brooklyn, N. Y.

Barnaby, Thomas J., No. 166 Broad street, Elizabeth, N. J.

Barr, Peter H., Main street, Alliance, Ohio.

Barry, Daniel E., No. 373 West Broadway, Boston, Mass.

Bartlett, Nicholas G., N. W. cor. Twenty-third street and Indiana avenue, Chicago, Ill.

Bartlett, William W., No. 189 High street, Boston, Mass.

Bassett, Charles H., No. 504 Washington street, Boston, Mass.

Bassett, Francis M., cor. Atlantic avenue and Court street, Brooklyn, N. Y.

Bassett, John W., Tomkinsville, L. I., N. Y.

Bauer, Louis G., cor. Fifth and Fairmount avenue, Philadelphia, Pa.

Baxley, J. Brown, cor. Howard and Franklin streets, Baltimore, Md.

Bayley, Augustus R., No. 607 Main street, Cambridgeport, Mass.

Beam, Isaac R., cor. Charles and Read streets, Baltimore, Md.

Becker, Charles, No. 138 High street, Georgetown, D. C.

Bedford, P. Wendover, No. 10 Gold street, New York.

Belden, James L., cor. Genesee and Furnace streets, Geddes, N. Y.

Bell, Gotthard E., cor. Jefferson and Shelby streets, Louisville, Ky.

Belt, Z. James, No. 601 Market street, Wilmington, Del.

Benjamin James H., No. 493 Tompkins avenue, Brooklyn, N. Y.

Berrian, George W., Jr., No. 1507 H street, N. W., Washington, D. C.

Best, John, No. 1 German Block, Central City, Col.

Biddle, Charles Johnson, City Hospital, Philadelphia.

Billings, Henry M., No. 278 Greenwich street, New York.

Bingham, Charles C., No. 5 Bank Block, Main street, St. Johnsbury, Vt.

Biroth, Henry, No. 111 Archer avenue, Chicago, Ill.

Bischof, Albert S., No. 34 First avenue, New York.

Bissell, John G., Rome, N. Y.

Blackman, Lyman R., No. 167 Thames street, Newport, R. I.

Blair, Andrew, cor. Eighth and Walnut streets, Philadelphia, Pa.

Blair, Henry C., cor. Eighth and Walnut streets, Philadelphia, Pa.

Blake, James E., No. 64 North Second street, New Bedford, Mass.

Blanding, William B., Nos. 54 and 58 Wey Vossel street, Providence, R. I.

Blank, Alois, No. 1353 South Fifth street, St. Louis, Mo.

Blatchford, Eben, No. 32 Main street, Rockport, Mass.

Blatterman, George W., Maysville, Ky.

Blinkhorn, George, S.E. cor. Chestnut and Tenth streets, Philadelphia, Pa.

Blocki, William F., No. 85 South Clark street, Chicago, Ill.

Blunt, Ira W., Inner Court, between Eleventh and Twelfth, and Main and Cary streets, Richmond, Va.

Bocking, Edmund, No. 1 Odd Fellows' Hall, Wheeling, W. Va.

Bodeker, Henry, cor. Fifteenth and East Main streets, Richmond, Va.

Boehm, Solomon, No. 800 Morgan street, St. Louis, Mo.

Boerner, Emil L., Haas Block, Clinton street, Iowa City, Ia.

Boggs, Edwin L., Kanawha Bank Building, Charlestown, W. Va.

Bolles, William P., No. 571 Dudley street, Boston, Mass.

Bond, Joseph R., No. 686 Sixth avenue, New York.

Booth, Clarence F., No. 128 Hall street, Brooklyn, N. Y.

Borell, Henry A., No. 1410 Chestnut street, Philadelphia, Pa.

Boring, Edwin M., cor. Tenth and Fairmount avenue, Philadelphia, Pa.

Borland, Matthew W., No. 378 West Van Buren street, Chicago, Ill.

Bossler, David J., No. 5186 Germantown avenue, Philadelphia, Pa.

Boutelle, William E., No. 28 Market street, Providence, R. I.

Bower, Henry, cor. Gray's Ferry Road and Twenty-ninth street, Philadelphia, Pa.

Bower, Henry A., cor. Sixth and Green streets, Philadelphia, Pa.

Bowker, James, cor. Sixth and Vine streets, Philadelphia, Pa.

Bowman, James H., No. 188 Dundas street, London, Ont., Can.

Boyce, Samuel F., west side of Public Square, Chillicothe, O.

Boyden, Edward C., cor. of Joy and Myrtle streets, Boston, Mass.

Boynton, Herschell, No. 74 Main street, Biddeford, Maine.

Brack, Charles, cor. Ensor and Forrest streets, Baltimore, Md.

Brackett, Aurick S., Tenth and Broadway, Kansas City, Mo.

Bradfield, L. H., Atlanta, Ga.

Brigham, Wm. C., Railroad Square, Medford, Mass.

Broughton, Albert J., No. 64 Dominick street, Rome, N. Y.

Brown, Alexander E., No. 25 Sharp street, Baltimore, Md.

Brown, Albert P., cor. Fifth and Federal streets, Camden, N. J.

Brown, Charles S., care of A. D. Edwards, Terrell, Texas.

Brown, George R., Poughkeepsie, N. Y.

Brown, Joseph J., Lock Box 175, Oakland, Cal.

Brown, Joseph T., No. 504 Washington street, Boston, Mass.

Brown, Joseph T., Jr., No. 504 Washington street, Boston, Mass.

Brown, William H., No. 25 Sharp street, Baltimore, Md.

Bruguier, Francis, No. 557 Market street, Newark, N. J.

Brumby, Richard T., Athens, Ga.

Brunner, Norman I., Macon, Ga.

Buck, George, S. W. cor. State and Madison streets, Chicago, Ill.

Buck, John, Nos. 104 and 106 Winnisimmet street, Chelsea, Mass.

Buck, John T., care of Buck & Baley, Jackson, Miss.

Buehler, Edward H., No. 170 William street, New York.

Bullard George S., No. 98 Genesee street, Utica, N. Y.

Bullock, Charles, No. 528 Arch street, Philadelphia, Pa.

Buntin, William C., No. 600 Main street, Terre Haute, Ind.

Bunting, Samuel S., cor. Tenth and Spruce streets, Philadelphia, Pa.

Burbank, George G., No. 221 Main street, Worcester, Mass.

Burdge, Jacob U., No. 482 Seventh avenue, New York.

Burge, J. O., Bowling Green, Ky.

Burgess, Edward, No. 152 Church street, Norfolk, Va.

Burley, Edwin P., No. 43 Temple Place, Boston, Mass.

Burnett Joseph, No. 27 Central street, Boston, Mass.

Burnham, Edward S., Charleston, S. C.

Burns, J. Kellar, cor. Sunbury and Lecona streets, Minersville, Pa

Burroughs, Silas M., Medina, N. Y.

Bury, Edward B., No. 412 Eighth street, S. E., Washington, D. C.

Bush, William, No. 56 Front street, Worcester, Mass.

Butler, Freeman H., No. 141 Central street, Lowell, Mass.

Butler, Osceola, Savannah, Ga.

Button, Elijah, No. 40 Hanover street, Annapolis, Md.

Cady, Hiram W., No. 74 Margaret street, Plattsburg, N. Y.

Calder, Albert L., No. 163 Westminster street, Providence, R. I.

Caldwell, James W., No. 242 Grand River avenue, Detroit, Mich.

Calvert, John, S. E. cor. Kearny and Clay streets, San Francisco, Cal.

Campbell, Horace W., No. 84 Front street, New York.

Campbell, Hugh, cor. Twenty-first and Locust streets, Philadelphia, Pa.

Campbell, Isaac T., No. 239 West Broadway, Boston, Mass.

Campbell, Samuel, No. 1412 Walnut street, Philadelphia, Pa.

Candidus, Philip C., cor. Dauphin and Cedar streets, Mobile, Ala.

Candler, Asa G., Atlanta, Ga.

Canning, Henry, No. 90 Green street, Boston, Mass.

Carle, John, Jr., No. 153 Water street, New York.

Carrell, Eugene A., Washington street, Morristown, N. J.

Carter, Solomon, No. 355 Washington street, Boston, Mass.

Casper, Thomas J., No. 41 East Main street, Springfield, O.

Cassebeer, Henry A., No. 57 Fourth avenue, New York.

Cassebeer, Henry A., Jr., No. 57 Fourth avenue, New York.

Catlin, Ephron, cor. Sixth street and Washington avenue, St. Louis, Mo.

Catlin, Theron, cor. Sixth street and Washington avenue, St. Louis, Mo.

Chadwick, Alexander B., No. 361 Court street, Brooklyn, N. Y.

Chamberlain, Guilford T., N. E. cor. Ninth and Chambers streets, St. Louis, Mo.

Chandler, Charles F., cor. Fourth avenue and Fiftieth street, New York.

Cherot, Leonce, cor. Morgan street and Leffingwell avenue, St. Louis, Mo.

Cherry, James B., No. 23 Fourth avenue, Pittsburg, Pa.

Chipman, Edward D., Unionville, Orange County, Va.

Choate, John, No. 208 Main street, Fitchburg, Mass.

Christiani, Charles, No. 484 Pennsylvania avenue, Washington, D. C.

Christiani, Theodore, No. 1150 Seventh street, N. W., Washington, D. C.

Clark, Albert B., Jr., No. 9 Main street, Galesburg, Ill.

Clark, John M., Milledgeville, Ga.

Close, Eldridge W., Charity Hospital, New York.

Close, George C., cor. Smith and Schermerhorn streets, Brooklyn, N. Y.

Clough, Thomas R., cor. Salem and Oakland streets, Medford, Mass.

Cochran, Samuel W., S. W. cor. Fourth and Walnut streets, Camden, N. J.

Cohen, Louis S., New York, and No. 1 Rue de Havre, Paris, France.

Colby, Frank A., Lancaster, N. H.

Colcord, Samuel M., Dover, Mass.

Cole, Theodore, No. 400 First avenue, New York.

Colgan, John, cor. Tenth and Walnut streets, Louisville, Ky.

Colton, James B., No. 766 Tremont street, Boston, Mass.

Cone, John W., No. 52 Wey Vossel street, Providence, R. I.

Congdon, Albert J., Main street, East Greenwich, R. I.
Conner, Jefferson S., No. 121 Pearl street, New Albany, Ind.
Connor, L. Myers, No. 502 Main street, Dallas, Texas.
Coombe, Thomas R., No. 3928 Market street, Philadelphia, Pa.
Cook, George E., No. 111 Pike street, Port Jervis, N. Y.
Cook, Thomas P., No. 838 North Ninth street, Philadelphia, Pa.
Cornell, Edward A., cor. Pine and Tenth streets, Williamsport, Pa.
Cotting, William A., Milledgeville, Ga.
Cotton, William H., No. 146 Thames street, Newport, R. I.
Covell, Thomas J., No. 38 Tennyson street, Boston, Mass.
Cowdin, George H., No. 25 Union Square, Somerville, Mass.
Craig, John S., Neponset avenue, Neponset, Boston, Mass.
Cramer, Henry, No. 320 Race street, Philadelphia, Pa,
Crawford, William H., No. 800 Washington avenue, St. Louis, Mo.
Crawley, Francis X., No. 2301 Carr street, St. Louis, Mo.
Cressler, Charles H., S. W. cor. Front and Main streets, Chambersburg, Pa.
Creuse, Jules L. A., No. 42 Pine street, New York.
Cromwell, Zachariah S., No. 480 Pennsylvania avenue, Washington, D. C.
Crossman, George A , No. 2 Simonds's Block, Brandon, Vt.
Cummings, Henry T., No. 696 Congress street, Portland, Me.
Currie, John H., No. 206 East Twenty-ninth street, New York.
Curry, David W., Cartersville, Ga.
Curtis, Lebbens, Searsport, Me.
Curtiss, Charles G., No. 833 De Kalb avenue, Brooklyn, N. Y.
Curtman, Charles O., No. 3718 North Ninth street, St. Louis, Mo.
Cutler, Edward Waldo, No. 89 Broad street, Boston, Mass.
Cutts, Foxwell C., Jr., No. 965 Fulton street, Brooklyn, N. Y.
Dalrymple, Charles H., Washington street, Morristown, N. J.
Dame, Samuel P., Nos. 280 and 282 State street, Sharon, Mercer County, Pa.
D'Amour, Otto, No. 2001 Broadway, St. Louis, Mo.
Dana, Edmund, Jr., No. 373 Congress street, Portland, Me.
Danforth, Edmund C., Cambridgeport, Mass.
Daniels, John B., No. 13 Decatur street, Atlanta, Ga.
Daniels, Samuel O., cor. Main and Summer streets, Natick, Mass.
Davis, Benjamin, No. 466 Grand street, New York.
Davis, Vincent, cor. Sixth and Chestnut streets, Louisville, Ky.
Dawson, Edward S., Jr., No. 13 South Salina street, Syracuse, N. Y.
Day, Carlos E., No. 1002 Broadway, Brooklyn, N. Y.
Day, Walter D., No. 56 East Thirty-fourth street, New York.
Daycock, William H., No. 649 Bedford avenue, Brooklyn, N. Y.
Dearborn, George L., No. 156 Main street, New Market, N. H.
Dege, George F., No. 233 Third street, New York.
Delavallade, John M., Plaquemines, La.
Deléry, Edgar, Bay St. Louis, Miss.
Denham, Charles S., Water street, Rockland, Mass.
Dennin, Charles, No. 33 Court street, Brooklyn, N. Y.
Diehl, C. Lewis, cor. Third and Broadway, Louisville, Ky.
Dikeman, Nathan, cor. Leavenworth and Dikeman streets, Waterbury, Ct.
Dill, J. B., Indianapolis, Ind.
Dimock, Robert H., No. 359 Grand street, Waterbury, Conn.

Ditman, Andrew J., No. 10 Astor House, New York.

Dobbins, Edward T., No. 1412 Walnut street, Philadelphia, Pa.

Dohme, Charles E., cor. Pratt and Howard streets, Baltimore, Md.

Dohme, Louis, cor. Pratt and Howard streets, Baltimore, Md.

Doliber, Thomas, No. 39 Tremont street, Boston, Mass.

Donnell, J. Woodbury, No. 12 Main street, Richmond, Me.

Donavin, Matthew W., cor. Lee and Sharp streets, Baltimore, Md.

Doolittle, Erastus H., No. 26 Tremont street, Boston, Mass.

Dougherty, Samuel E., No. 68 Wythe avenue, Jersey City, N. J.

Douglass, Henry, Jr., Brooklyn, N. Y.

Drake, Charles W., Middleboro, Mass.

Drake, Jonathan B., No. 132 Broad street, Elizabeth, N. J.

Drake, John R., No. 255 S. Water street, Milwaukee, Wis.

Drake, Robert S., station 6, Elleandville, St. Louis, Mo.

Dreher, Ernest, No. 953 Broad street, Newark, N. J.

Drew, John W., No. 901 Pennsylvania avenue, Washington, D. C.

Drury, Linus D., cor. Warren and Dudley streets, Boston, Mass.

Dryer, James W., No. 344 East Washington street, Indianapolis, Ind.

Duble, Jesse B., cor. Pan and Fourth streets, Williamsport, Pa.

Duckett, Walter G., cor. Twenty-second street and Pennsylvania avenue, Washington, D. C.

Dudley, Oscar E., No. 423 Fulton street, Brooklyn, N. Y.

Dufor, Clarence R., No. 1814 Fourteenth street, Washington, D. C.

Dung, Albert C., No. 61 Bowery, New York.

Dunk, Alfred A., Genesee cor. Washington street, East Saginaw, Mich.

Dunn, John A., No. 56 Dougherty street, Brooklyn, N. Y.

Dupuy, Eugene, No. 420 Van Brunt street, Brooklyn, N. Y.

Dupuy, Powhatan E., No. 427 East Broad street, Richmond, Va.

Dyson, Dunbar S., Bloomington, Ill.

Eareckson, Edwin, cor. Baltimore and High streets, Baltimore, Md.

Eastman, Charles S., N. E. cor. Main and Depot streets, Concord, N. H.

Easton, Luther W., Union near Webster street, Rockland, Mass.

Eaton, Charles I., No. 1433 Washington street, Boston, Mass.

Eberbach, Ottmar, No. 12 South Main street, Ann Arbor, Mich.

Eberle, Charles L., No. 4779 Germantown avenue, Philadelphia, Pa.

Eberle, Herman T., care G. E. Eberle & Son, Watertown, Wis.

Ebert, Albert E., Chicago, Ill.

Eckel, Augustus W., Charleston, S.C.

Eddy, Henry C., cor. Eighteenth and Lombard streets, Philadelphia, Pa.

Eger, George, No. 839 and 841 Central avenue, Cincinnati, O.

Eggers, Frederick H., No. 192 Ohio street, Alleghany City, Pa.

Eimer, Charles, No. 205 Third avenue, New York.

Elbe, Constantine B., cor. Houston and Losoya streets, San Antonio, Texas.

Eldridge, George W., cor. Seventh and Thompson streets, Philadelphia, Pa.

Elliot, William, No. 3 Front street, East Toronto, Can.

Elliott, Henry A., No. 286 Lexington street, Baltimore, Md.

Ellis Evan T., No. 133 S. Front street, Philadelphia, Pa.

Ellis, William L. A., Hawkinsville, Pulaski County, Ga.

Emanuel, Louis, cor. 2d and Grant streets, Pittsburg, Pa.

Emich, Columbus V., No. 136 North Howard street, Baltimore, Md.

England, Robert, No. 800 South Tenth street, Philadelphia, Pa.

Entwisle, William B., No. 1201 Pennsylvania avenue, Washington, D. C.

Erben, John S., No. 1200 Vine street, Philadelphia, Pa.

Estes, Joseph, cor. Union and Church streets, Rockland, Mass.

Evans, Joseph S., P. O. Box 657, West Chester, Pa.

Faber, John, No. 990 Sixth avenue, New York.

Fahlen, Julius, Nos. 54 and 56 Beal street, Memphis, Tenn.

Fairbanks, Harlan, cor. Southbridge and Myrtle streets, Worcester, Mass.

Fairchild, Benjamin T., cor. Broadway and Twenty-fifth street, New York.

Fale, John, care of John Fale & Co., Hawkinsville, Ga.

Featherston'h, Edward R., No. 1208 Chouteau avenue, Trenton, Mo.

Feemster, Joseph H., No. 99 Walnut street, Cincinnati, O.

Fennel, Adolphus, cor. Eighth and Vine streets, Cincinnati, O.

Fenner, William R, care of W. D. Hoyt & Co., Rome, Ga.

Ferguson, Robert B., corner Second street and Pennsylvania avenue, Washington, D. C.

Ferree, Henry D., Springfield, Mass.

Ferris, Charles E., Lawrenceburg, Ind.

Fickardt, George H., No. 215 Main street, Circleville, O.

Field, Amos, No. 26 Vine street, Macon, Mo.

Finger, Henry J., Santa Barbara, Cal.

Finlay, Norman J., No. 170 William street, New York.

Finney, Thomas J., No. 300 Boas street, Harrisburg, Pa.

Fischer, Edward J., No. 96 North Wells street, Chicago, Ill.

Fish, Charles F., No. 104 Broadway, Saratoga Springs, N. Y.

Fisher, William, No. 488 Hudson street, New York.

Flanagan, Lewis C., No. 222 North avenue, North Cambridge, Mass.

Flemmish, Doric B., No. 139 Canal street, New Orleans, La.

Flint, John H., Marysville, Cal.

Foley, J. T., No. 106 Main street, Houston, Texas.

Follansbee, Sherman, cor. North Main and Benefit streets, Providence, R. I.

Foltz, William K., No. 1465 Howard street, Akron, O.

Ford, W. Thomas, Kansas City, Mo.

Fougera, C. Edmund, No. 30 North William street, New York.

Fowle, Henry D., No. 71 Prince street, Boston, Mass.

Fox, Daniel S., cor. State and Madison streets, Chicago, Ill.

Fox, Peter P., No. 2300 Spruce street, Philadelphia, Pa.

Frames, James P., cor. Gay and Aisquith street, Baltimore, Md.

Fraser, Edward A., New York city.

Fredigke Charles C., No. 472 State street, Chicago, Ill.

French, George W., No. 360 Washington street, Boston, Mass.

Frey, John, Bedford Hospital, New York.

Frohwein, Richard, No. 122 First street, Elizabethport, N. J.

Frohwein, Theobald, No. 218 Stanton street, New York.

Frost, James, Nos. 169, 171, 173 Georgia street, Valleja, Solano Co., Cal.

Frost, John J., N. E. cor. of Main and Mill streets, Lexington, Ky.

Frost, William A., No. 167 Thames street, Newport, R. I.

Frothingham, Edward G., Jr., Elm street, cor. Main and Water, Haverhill, Mass.

Früh, Carl D. S., cor. Camac and Oxford streets, Philadelphia, Pa.

Fuller, Henry W., No. 24 Market street, Chicago, Ill.

Fuller, Oliver F., No. 24 Market street, Chicago, Ill.

Fuller, Sumner H., Hancock street near Columbia street, Boston, Mass.

Gaillard, Edward, No. 1802 North Eleventh street, Philadelphia, Pa.

Gale, Edwin O., No. 85 South Clark street, Chicago, Ill.

Gale, William H., No. 85 South Clark street, Chicago, Ill.

Gallagher, Charles K., Second street, Washington, N. C.

Gardiner, Warren B., No. 10 Gold street, New York.

Gardner, Robert W., New York city.

Garrigues, Samuel S., Derby Block, North Water street, East Saginaw, Mich.

Garrison, Herod D., No. 511 State street, Chicago, Ill.

Gates, Burt P., No. 388 Broadway, Saratoga, N. Y.

Gates, Carroll E., No. 388 Broadway, Saratoga, N. Y.

Gates, Howard E., care of Wessels and Gates, Litchfield, Conn.

Gaylord, Henry C., No. 110 Monument Square, Cleveland, O.

Gellatly, William A., No. 170 William street, New York.

Genois, Louis, No. 113 Canal street, New Orleans, La.

George, Charles T., No. 1306 North Third street, Harrisburg, Pa.

Gerhard, Samuel, cor. Hanover and Belgrade streets, Philadelphia, Pa.

Gessner, Emil A., New Haven, Conn.

Gibson, William A., No. 580 King street, Charleston, S. C.

Gill, George, P. O. Box 17, Mount Vernon, N. Y.

Gilman, Samuel K., No. 307 Washington street, Boston, Mass.

Gilmore, John W., Third avenue cor. One hundred and thirty-eighth street, New York.

Girling, Robert N., P. O. Box 1310, New Orleans, La.

Giroux, Edmond, Quebec, Canada.

Gleeson, James A., No. 51 Harrison avenue, Boston, Mass.

Gleeson, Michael H., No. 226 West Broadway, Boston, Mass.

Glenn, Thomas S., cor. Fourteenth street and Washington avenue, St. Louis, Mo.

Godding, John G., cor. Berkeley and Boylston streets, Boston, Mass.

Good, James M., cor. Twenty-third street & Clark avenue, St. Louis, Mo.

Goodman, Charles F., No. 180 Farnham street, Omaha, Neb.

Goodrich, Stephen, care of L. G. Moses & Co., Hartford, Conn.

Goodwin, Lester H., cor. State and Main streets, Hartford, Conn.

Goodwyn, John W., Petersburg, Va.

Gordon, William J. M., No. 142 Walnut street, Cincinnati, O.

Gordon, Edward B., No. 73 Broad street, Lynn, Mass.

Gosman, Adam J., cor. Charles and Mulberry streets, Baltimore, Md.

Graham, William A., No. 30 Columbus avenue, Sandusky, O.

Grahame, Israel J., cor. Twelfth and Filbert streets, Philadelphia, Pa.

Grandjean, Charles, 2828 North Fourteenth street, St. Louis, Mo.

Grandjean, Eugene, 2828 North Fourteenth street, St. Louis, Mo.

Gray, Francis M., Main street, Hopkinsville, Ky.

Gray, Henry R., No. 144 St. Lawrence street, Montreal, Quebec, Canada.

Gray, William H., Sandford street, Springfield, Mass.

Green, Thomas T., Hudson River Hospital, Poughkeepsie, N. Y.

Greene, Charles H., Atlanta, Ga.

Greene, George E., Wyoming, R. I.

Gregory, Edmund, Kent street, Lindsay, Ontario, Canada.

Greve, Theodore L. A., cor. John and Sixth streets, Cincinnati, O.

Gridley Junius, No. 87 Maiden Lane, New York.

Grieve, Fleming G.,Milledgeville, Ga

Griffith, Albert R., No. 33 Centre street, Oil City, Pa.

Griffith, Hiram E., Grant's Block, Niagara Falls, N. Y.

Griffith, William H., No. 1230 Third avenue, New York.

Griswold, William H., cor. Main and Holden streets, North Adams, Mass.

Grossklaus, John F., cor. High street and Public Square, Navarre, O.

Grove, John E., 3326 Germantown avenue, Philadelphia, Pa.

Haas, George H., 38 Main street, Rochester, N. Y.

Haddox, James B., No. 42 North College street, Nashville, Tenn.

Hadley, Frank R., No. 64 North Second street, New Bedford, Mass.

Haenchen, Charles E., No. 3838 Haverford Road, Philadelphia, Pa.

Haight, William B., care Lockwood & Haight, Bogardus, Stamford, Conn.

Hale, Frederick, No. 152 William street, New York.

Hall, Marshall C., care of Hall Brothers, Fredericksburg, Va.

Hall, Roland B., No. 90 Cherry street, Macon, Ga.

Hance, Edward H., cor. Callowhill and Marshall streets, Philadelphia, Pa.

Hancock, Charles W., No. 3425 Spring Garden street, Philadelphia, Pa.

Hancock, John F., cor. Baltimore and Caroline streets, Baltimore, Md.

Hancock, John Henry, No. 1412 Walnut street, Philadelphia, Pa.

Hankinson, Thomas, Augusta, Ga.

Hanson, Dominicus, Central Square, Rochester, N. Y.

Harbers, William H., Laurens street, Aiken, S. C.

Harlow, Noah S., No. 4 Smith's Block, Bangor, Me.

Harlow, Wickham N., No. 219 Main street, Orange, N. J.

Harner, James M., New York city.

Harper, Frank M., No. 45 East Main street, Madison, Ind.

Harrington, Frank, Werland's Block, Main street, Logan, O.

Harrop, Joseph, No. 700 South Fifth street, Leavenworth, Kan.

Hartness, William H., No. 109 Ontario street, Cleveland, O.

Hartung, Hugo R., Odd Fellows' Hall, Wheeling, W. Va.

Harvey, Edmund, Toronto, Can.

Harwood, Frank L., Main street, Warren, Mass.

Harwood, Lucien, Main street, Warren, Mass.

Hassencamp, Ferdinand, No. 75 Hanover street, Baltimore, Md.

Hatch, Frederick A., Providence, R.I.

Hatton, Edgar M., Zanesville, O.

Haviland, Henry, No. 23 John street, New York.

Hawkins, Joseph T., Mobile, Ala.

Hawkins, M. Smith, No. 20 Broadway, Salem, Columbiana Co., O.

Hay, Henry H., cor. Free and Middle streets, Portland, Me.

Hays, David, No. 207 Division street, New York, N. Y.

Hazlett, Edw'd E., S.E. cor. Norris and Mervine streets, Philadelphia, Pa.

Hebberling, Gottfried, No. 695 Seventh street, New York.

Heimstreet, Edward B., care of S. Heimstreet & Son, Janesville, Wis.

Heinemann, Otto, cor. Laurel and Lynn streets, Cincinnati, O.

Heinitsh, Charles A., No. 16 East King street, Lancaster, Pa.

Heinitsh, Edward H., Columbia, S. C.

Heintzelman, Joseph A., cor. Ridge av. and Master streets, Philadelphia, Pa.

Heller, Peter H., No. 505 Pennsylvania avenue, Washington, D. C.

Helman, Charles M., cor. Findlay and Baymiller streets, Cincinnati, O.

Henderson, John, Toronto, Can.

Henes, William F., No. 1620 Third avenue, New York.

Henrich, George, cor. Mill and Jefferson streets, Mascoutah, Ill.

Hepburn, John, No. 93 Main street, Flushing, N. Y.

Herbruger, Florence C., Panama, U. S. of Colombia.

Hermann, T. George, Cumberland, Md.

Heuerman, Henry W., No. 120½ Claiborne avenue, Chicago, Ill.

Heydenreich, Emile, No. 169 Atlantic avenue, Brooklyn, N. Y.

Heydenreich, F. Victor, No. 169 Atlantic avenue, Brooklyn, N. Y.

Heyl, James B., Vice Consul, Hamilton, Bermuda.

Hickling, Daniel P., No. 301 Pennsylvania avenue, Washington, D. C.

Higgings, Albert W., No. 41 Merchants' Row, Rutland, Vt.

Higgins, James S., No. 24 Delancey street, New York.

Hildreth, Charles F., No. 54 Main street, Suncook, N. H.

Hill, Alfred C., cor. Fourth and Smith streets, Cincinnati, O.

Hinsdale, Samuel J., Market Square, Fayetteville, N. C.

Hoagland, Pratt R., No. 744 Harrison avenue, Boston, Mass.

Hodge, Charles, Nos. 75 and 76 Front street, Portland, Ore.

Hodgetts, George, No. 365 Yonge street, Toronto, Can.

Hoerner, Theodore, Nos. 54 and 56 Beal street, Memphis, Tenn.

Hoffmann, Frederick, No. 797 Sixth avenue, New York.

Hogan, Louis C., cor. Forty-seventh and State streets, Chicago, Ill.

Hohenthal, Charles F. L., No. 857 Third avenue, New York.

Hohly, Charles, No. 248 St. Clair street, Toledo, O.

Holden, Henry, No. 62 High street, Clinton, Mass.

Holland, Samuel P., cor. Smithfield and Liberty streets, Pittsburg, Pa.

Holmes, Clay W., No. 319 East Water street, Elmira, N. Y.

Holt, Alvin E., No. 333 Woodward avenue, Detroit, Mich.

Holzhauer, Charles, No. 787 Broad street, Newark, N. J.

Hood, Charles I., cor. Merrimac and Central streets, Lowell, Mass.

Hooper, John H., No. 171 North Clark street, Chicago, Ill.

Hopp, Lewis C., Cleveland, O.

Horn, Wilbur F., No. 32 West Main street, Carlisle, Pa.

Horton, William F., No. 15 Central street, Boston, Mass.

Hostetter, Charles M., No. 272 Penn avenue, Pittsburg, Pa.

Hottendorf Augustus, cor. Central avenue and Baymiller street, Cincinnati, O.

Howard, Daniel N., Railroad Square, Medford, Mass.

Howarth, James L., Atlanta, Ga.

Howarth, John W., Genesee street, Utica, N. Y.

Howson, Walter H., Water street, Chillicothe, O

Hoyt, George M., No. 61 Warren street, Boston, Mass.

Hubbard, John H., No. 468 Harvard street, Cambridge, Mass.

Huddart, John F., Second and Chestnut streets, Louisville, Ky.

Hudnut, Alexander, No. 218 Broadway, New York.

Hughes, Benjamin L., Jacksonville, Fla.

Huling, Bruce, No. 109 Ontario street, Cleveland, O.

Hunt, James L., cor. North and Main streets, Hingham, Mass.

Hunt, Leonard W., Fourth street, Macon, Ga.

Hurst, John C., No. 925 Market street, Philadelphia, Pa.
Huston, Charles, No. 43 South High street, Columbus, O.
Hyler, William H., Port Chester, N. Y.
Imhof, Henry, Ho. 189 East Broadway, New York.
Ingalls, John, cor. Fourth and Poplar streets, Macon, Ga.
Ink, Parker P., Washington, Iowa.
Inness, George, No. 47 University Place, New York.
Jackson, Vincent R., cor. Gilman and Stewart streets, Baltimore, Md.
Jacobus, Judson S., cor. Thirty-first street and Indiana avenue, Chicago, Ill.
Jacques, George W., cor. Broadway and Augusta street, S. Amboy, N. J.
Jaggar, Charles H., P. O. Box 113, Nantucket, Mass.
James, George R., No. 120 Grand street, Schoolcraft, Mich.
James, Thomas P., No. 94 Brattle street, Cambridge, Mass.
Jarrett, Henry T., New York city.
Jauncey, William, No. 112 Milwaukee avenue, Chicago, Ill.
Jefferson, John H. B., No. 96 South Broadway, Baltimore, Md.
Jefferson, William E., Fredericktown, O.
Jenkins, Luther L., No. 119 Leverett street, Boston, Mass.
Jenks, Thomas L., Merrimac and Traverse streets, Boston, Mass.
Jenks, William J., No. 160 North Third street, Philadelphia, Pa.
Jennings, N. Hynson, No. 90 North Charles street, Baltimore, Md.
Jesson, Jacob, Pentwater, Wis.
Johnson, Benjamin F., No. 301 East Girard avenue, Philadelphia, Pa.
Johnson, Charles B., Third street, Middletown, O.
Johnson, Edward L., Tenth avenue cor. One hundred and fifty-seventh street, New York.
Johnston, William, Nos. 153 and 155 Jefferson avenue, Detroit, Mich.
Jones, Alexander H , Ninth and Parrish streets, Philadelphia, Pa.
Jones, Charles K., Leffingwell and Washington avenue, St. Louis, Mo.
Jones, Charles M., Fore street, Somersworth, N. H.
Jones, Daniel S., Twelfth and Spruce streets, Philadelphia, Pa.
Jones, Edward C., S. E. cor. Fifteenth and Market streets, Philadelphia, Pa.
Jones, James T., No. 855 East Fourth street, Boston, Mass.
Jones, Simon N., First and Jefferson streets, Louisville, Ky.
Jones, Thomas, Nos. 1060 and 1062 Fulton street, Brooklyn, N. Y.
Jordan, Francis, Court-house Square, Goderich, Can.
Jordan, William H., No. 104 Lincoln street, Portland, Me.
Judge, John F., near cor. Court and Cutter streets, Cincinnati, O.
Kalb, Theodore, Second and Poplar streets, St. Louis, Mo.
Kalish, Julius, No. 409 Grand street, New York.
Karch, Joseph L., Ninth and Cumberland streets, Lebanon, Pa.
Kay, Isaac H., No. 1101 Arch street, Philadelphia, Pa.
Keasby, Henry G., No. 332 North Front street, Philadelphia, Pa.
Keeler, William H., P. O. Box 585, Saginaw City, Mich.
Keeney, Caleb R., Sixteenth and Arch streets, Philadelphia, Pa.
Keeshan, John, Sixth and Walnut streets, Cincinnati, O.
Keffer, William P., Nos. 73, 75, and 77 Tchoupitoulas street, New Orleans, La.
Kelley, Edward S., Boylston and Berkeley streets, Boston, Mass.

Kelsey, Henry J., No. 37 Gove street, New Haven, Conn.

Kennedy, George W., No. 103 North Centre street, Pottsville, Pa.

Kent, Robert R., No. 7 Winthrop Block, Boston, Mass.

Kerr, James, Jr., No. 56 Springfield street, Pittsburg, Pa.

Kettell, George P., No. 250 Main street, Charlestown, Mass.

Keys, Roger, Twelfth and Pine streets, Philadelphia, Pa.

Kidder, Samuel, Jr., No. 27 Commercial street, Lowell, Mass.

Kidwell, John L., No. 1531 I street N. W., Washington, D. C.

Kielhorn, Henry, Camelton, Ind.

Kiersted, Henry T., New York.

Kimmel, Henry, No. 65 Avenue A, New York.

King, James T., Main and South streets, Middletown, N. Y.

Kirkbride, Joseph C., cor. Olive street and Jefferson avenue, St. Louis, Mo.

Kitchen, Charles W., cor. Fulton and Washington streets, Brooklyn, N. Y.

Klie, G. H. Charles, Bellefontaine road, Lowell, N. St. Louis, Mo.

Kline, Mahlon N., No. 309 and 311 North Third street, Philadelphia, Pa.

Klussmann, Hermann, cor. Fourth st. and Lafayette avenue, Hoboken, N. J.

Knabe, Gust. A., No. 484 Pennsylvania avenue, Washington, D. C.

Knowles, Henry A., No. 463 Yonge street, Toronto, Can.

Knowlson, Alexander M., No. 350 Broadway, Troy, N. Y.

Koch, Louis, cor. Fourth and Wood streets, Philadelphia, Pa.

Koehnken, Herman H., cor. Third and Mill streets, Cincinnati, O.

Krebs, Hugo, cor. Third and Market streets, St. Louis, Mo.

Krehbiel, Gustavus, No. 243 East Houston street, New York.

Krewson, William E., cor. Eighth and Montgomery streets, Philadelphia, Pa.

Krieger, Philip, cor. Myrtle and Marcey streets, Brooklyn, N. Y.

Krusemarck, Charles, cor. Twenty-second street and Indiana avenue, Chicago, Ill.

Kuhn, Norman A., Salem, O.

Laird, William R., No. 250 Washington street, Jersey City, N. J.

Land, Robert H., No. 270 Broad street, Augusta, Ga.

Lander, John C., Yorkville, Toronto, Can.

Lane, Alfred S., No. 18 Buffalo street, Rochester, N. Y.

Langebecker, Charles O., Jefferson Parish, Gretna, La.

Larwill, Joseph H., Jr., Bolivar, Tenn.

Lattimer, Robert F., No. 74 Elm street, Westerly, R. I.

Lauer, Michael J., No. 275 Mulberry street, Baltimore, Md.

Laurent, Eugene L., No. 27 Cedar street, Nashville, Tenn.

Lautenbach, Robert, cor. Eutaw and Saratoga streets, Baltimore, Md.

Lawlor, Charles J., No. 649 Bedford avenue, Brooklyn, N. Y.

Lawton, Charles H., No. 91 Union street, New Bedford, Mass.

Lawton, Horace A., No. 91 Union street, New Bedford, Mass.

Laycock, Washington, No. 44 Union avenue, Rondout, N. Y.

Lazell, Lewis T., No. 10 Gold street, New York.

Leary, Jeremiah T., No. 239 West Broadway, Boston, Mass.

Lee, Addison S., No. 14 Fayetteville street, Raleigh, N. C.

Lee, Emmor H., S. W. cor. Fourth and Linden streets, Camden, N. J.

Lee, James A., Main street, New Iberia, La.

Lehlbach, Paul F., No. 449 Tenth avenue, New York.

Lehn, Louis, No. 160 William street, New York.

Leis, George, No. 90 Massachusetts street, Lawrence, Kan.

Leitch, Arthur, care of E. Shendell, St. Louis, Mo.

Lemberger, Joseph L., No. 8 North Ninth street, Lebanon, Pa.

Levering, P. Wharton, cor. Newark and Baldwin avenues, Jersey City, N. J.

Levy, Adolph, No. 403 Hudson street, New York.

Lewis, Elam C., No. 2 West, cor. Merchants' row, Rutland, Vt.

Lewis, Samuel E., No. 1404 Fourteenth street, Washington, D. C.

Lewis, Thomas, No. 137 Myrtle avenue, Brooklyn, N. Y.

Lillie, Charles, Main street, Great Barrington, Mass.

Lilly, Alonzo, Jr., No. 31 Hanover street, Baltimore, Md.

Lilly, Eli, No. 36 South Meridian street, Indianapolis, Ind.

Lincoln, Henry W., No. 185 Warren street, Boston, Mass.

Lindeman, Herman E., Box 326, Austin, Texas.

Lindewald, Wilhelm E., Paris, France

Lingelbach, Ferd., No. 328 Broadway, Louisville, Ky.

Lippincott, Henry B., cor. Twentieth and Cherry streets, Philadelphia, Pa.

Little, James, Harrisonburg, Va.

Littlefield, Alvah, No. 196 Lincoln street, Boston, Mass.

Livingston, Borent V. B., No. 306 Broadway, Brooklyn, N. Y.

Llewellyn, John F., west side Public street, Mexico, Adrian County, Mo.

Lloyd, John U., cor. Court and Plum streets, Cincinnati, O.

Lobstein, J. F. Daniel, Main street, Sag Harbor, N. Y.

Lohman, George H., No. 1 Mitchell's Block, Kendallville, Ind.

Loomis, John C., cor. Chestnut and Wall streets, Jeffersonville, Ind.

Lowd, John C., No. 43 Temple Place, Boston, Mass.

Lowden, John, No. 18 De Breseles street, Montreal, Can.

Luckenback, Edward H., No. 3 Broad street, Bethlehem, Pa.

Ludlow, Charles, No. 55 East Main street, Springfield, O.

Luhn, Gustavus J., P. O. Box 582, Charleston, S. C.

Lumsden, Charles H., No. 55 East Main street, Lynchburg, Va.

Lyman, Stephen J., No. 582 South Paul street, Montreal, Quebec, Can.

Lyons, Isaac L., Nos. 42 and 44 Camp street, New Orleans, La.

McAfee, James A., S. E. cor. Eighth and Jefferson streets, Louisville, Ky.

McCarty, William, North Park Place, Morristown, N. J.

McConville, Thomas A., No. 24 Trumbull street, Worcester, Mass.

McElhenie, Thomas D., No. 259 Ryerson street, Brooklyn, N. Y.

McInall, Edward, Jr., cor. Second and Market streets, Wilmington, Del.

McIntyre, Byron F., No. 10 Gold street, New York.

McIntyre, Ewen, No. 874 Broadway, New York.

McIntyre, William, No. 2229 Frankford avenue, Philadelphia, Pa.

McKay, George J., Second street, Eureka, Humboldt Bay, Cal.

McKelway, George J., No. 1410 Chestnut street, Philadelphia, Pa.

McKenney, Jesse F., Shelbyville, Ky.

McKesson, John, Jr., No. 91 Fulton street, New York.

McPherson, George, Chicago, Ill.

Macdonald, George, No. 106 Main street, Kalamazoo, Mich.

Mace, F. Borden, Front street, Beaufort, N. C.

Macmahon, Thomas J., No. 138 Sixth avenue, New York.

Magill, Benjamin M., cor. Seventeenth and Columbia avenue, Philadelphia, Pa.

Mahla, Frederick, cor. Twenty-first street and Howard avenue, Chicago, Ill.

Main, Thomas F., No. 181 Main street, New Britain, Conn.

Maisch, John M., No. 145 North Tenth street, Philadelphia, Pa.

Major, John R., No. 800 Seventh street, Washington, D C.

Mallinckrodt, Edward, cor. Mallinckrodt and Main streets, St. Louis, Mo.

Mangold, Gustavus A., No. 4 East State street, Trenton, N. J.

Markoe, George F. H., cor. Warren and Dudley streets, Boston, Mass.

Marsh, Edward H., No. 10 Gold street, New York.

Marshall, Ernest C., No. 51 Vine street, Charlestown, Mass.

Marshall, Hubert J., Aurora, Ind.

Martin, Emil, Russell avenue and South Meridian street, Indianapolis, Ind.

Marvel, Amos F., Taunton, Mass.

Marvin, Thomas E. O., Nos 36 and 38 Bow street, Portsmouth, N. H.

Masi, Frederick H., Main and Granby streets, Norfolk, Va.

Mason, Norman N., No. 129 North Main street, Providence, R. I.

Massey, George, care of Lyman Bros. & Co., Toronto, Ont., Can.

Massenburg, Thomas L., Macon, Ga.

Mattern, William K., No. 2540 Germantown avenue, Philadelphia, Pa.

Mattison, Richard V., No. 332 North Front street, Philadelphia, Pa.

May, James O, Naugatuck, Conn.

Mayell, Alfred, cor. Euclid avenue and Erie street, Cleveland, O.

Meade, Richard H., No. 909 Main street, Richmond, Va.

Melchers, Henry, cor. Genesee and Jefferson streets, East Saginaw, Mich.

Mellor, Alfred, No. 218 North Twenty-second street, Philadelphia, Pa.

Melvin, James S., No. 43 Temple Place, Boston, Mass.

Menard, Alexander A., Fourth street, Macon, Ga.

Menninger, Henry J., No. 25 Sands street, Brooklyn, N. Y.

Mercein, James R., No. 41 Montgomery avenue, Jersey City, N. J.

Merrill, William S., No. 5 West Fifth street, Cincinnati, O.

Merrill, Charles A., No. 52 Water street, Exeter, N. H.

Merrill, Walter S., Maple street, Danvers, Mass.

Metcalf, Theodore, No. 39 Tremont street, Boston, Mass.

Meyer, Christian F. G, No. 8 North Second street, St. Louis, Mo.

Meyers, Edward T., No. 16 Main street, Bethlehem, Pa.

Meyers, James A., Odd Fellows' Hall, Columbia, Pa.

Michaelis, Charles O, cor. King and Cannon streets, Charleston, S. C.

Milburn, John A., No. 1429 Pennsylvania avenue, Washington, D. C.

Milhau, Edward L., No. 183 Broadway, New York.

Mill, James W., cor. Ogden and West Madison streets, Chicago, Ill.

Milleman, Philip, cor. Milwaukee avenue and Division street, Chicago, Ill.

Miller, Adolphus W., cor. Third and Callowhill streets, Philadelphia, Pa.

Miller, Charles M., Mansfield, O.

Miller, Frederick C., cor. Clay and Market streets, Louisville, Ky.

Miller, George Y., No. 2 River street, Luzerne, Warren Co., New York.

Miller, Jacob A., cor. Second and Chestnut streets, Harrisburg, Pa.

Miller, Louis, No. 49 High street, Mount Holly, N. J.

Miller, Polk, No. 900 East Main street, Richmond, Va.

Milligan, Decatur, No. 509 North Second street, Philadelphia, Pa.

Milliner, William T., Union street, Spencerport, N. Y.

Mingay, James, No. 472 Broadway, Saratoga Springs, N. Y.

Mitchell, Charles L., cor. Ninth and Race streets, Philadelphia, Pa.

Mittnacht, Henry, cor. Pennsylvania avenue and Townsend street, Baltimore, Md.

Miville, Francis C., No. 1023 Elm street, Manchester, N. H.

Moffit Thomas S., San Francisco, Cal.

Mohr, Charles, No. 177 Dauphin street, Mobile, Ala.

Moise, Benjamin F., No. 130 Meeting street, Charleston, S. C.

Moith, Augustus T., No. 1 Ferry street, Fishkill, N. Y.

Moll, William, Saginaw City, Mich.

Molwitz, Ernest, No. 948 Sixth avenue, New York.

Monsarrat, Oscar, No. 113 South Broadway, Baltimore, Md.

Moody, Richard H., cor. Main and High streets, Belfast, Me.

Moore, George, No. 26 Market street, Somersworth, N. H.

Moore, J. Faris, Howard and Madison streets, Baltimore, Md.

Moore, James P., No. 261 Superior street, Cleveland, O.

Moore, Joachim B., Thirteenth and Lombard streets, Philadelphia, Pa.

Moore, Thomas F., Mobile, Ala.

Moorhead, William W., No. 818 Arch street, Philadelphia, Pa.

Morgan, Benjamin G., Main and Jackson streets, Hyde Park, Pa.

Morgan, James, Ypsilanti, Mich.

Morgan, Richard E., Great Barrington, Mass.

Morgan, Young H., Cochran, Ga.

Morley, William J., No. 203 East Pecan street, Austin, Texas.

Morrill, Benjamin, care of Centis, Gates & Co., Littleton, N. H.

Morrison, Samuel C., Main street, Stamford, Conn.

Morrison, S. Ellwood, No. 25 Sharp street, Baltimore, Md.

Morrison, Thomas O., No. 166 Eighth avenue, New York.

Mortimer, William G., New York.

Mueller, Adolphus, Cherry street, Highland, Ill.

Munds, James C., Third street, Wilmington, N. C.

Munson, Luzerne J., Apothecaries' Hall, Waterbury, Conn.

Murray, Francis M., Philadelphia, Pa.

Muth, John P., Nos. 14 and 16 German street, Baltimore, Md.

Needles, Caleb H., Twelfth and Race streets, Philadelphia, Pa.

Neergaard, William, No. 1183 Broadway, New York.

Newbold, Thomas M., No. 4160 Chestnut street, Philadelphia, Pa.

Newman, George A., cor. Fifth and Walnut streets, Louisville, Ky.

Newman, George A., No. 380 Myrtle avenue, Brooklyn, N. Y.

Nesbitt, Charles A., cor. Seventeenth and Franklin streets, Richmond, Va.

Nichols, Edward P., No. 901 Broad street, Newark, N. J.

Nichols, Thomas B., No. 159½ Essex street, Salem, Mass.

Nick, William F., Jr., No. 1390 Peach street, Erie, Pa.

Nicot, Lewis E., No. 54 Union street, Brooklyn, N. Y.

Niebrugge, John A., No. 506 Bedford avenue, Brooklyn, N. Y.

Nietsch, Adolph J. W., Harrison avenue and Walnut street, Brooklyn, N. Y.

Noble, John J., Centre and Pelham streets, Newton Centre, Mass.

Nolting, Adolphus W., Jr., No. 1722 East Main street, Richmond, Va.

Nowell, William F., No. 192 Merrimac street, Boston, Mass.

Noyes, Parker J., Lancaster, N. H.

Oatman, Le Roy S., Angola, Erie County, N. Y.

O'Brien, James J., No. 53 Kneeland street, Boston, Mass.

O'Donnel, James D., No. 751 Eighth street, Washington, D. C.

O'Gallagher, James, No. 2325 Broadway, St. Louis, Mo.

Ohliger, Lewis P., No. 23 West Liberty street, Wooster, O.

Oldberg, Oscar, Treasury Department, Washington, D. C.

Oleson, Olaf M., Market street, Fort Dodge, Ia.

Oliver, William M., No. 132 Broad street, Elizabeth, N. J.

Ollif, James H., No. 855 Fulton street, Brooklyn, N. Y.

Orne, Charles P., No. 493 Main street, Cambridgeport, Mass.

Orne, Joel S., No. 493 Main street, Cambridgeport, Mass.

Osburn, William H., cor. Greene and Baltimore streets, Baltimore, Md.

Osgood, Hugh H., No. 148 Main street, Norwich, Conn.

Osmun, Charles A., No. 13 Seventh avenue, New York.

Ottinger, James J., No. 1412 Walnut street, Philadelphia, Pa.

Owens, Richard J., cor. Myrtle and Spencer streets, Brooklyn, N. Y.

Oxley, Jefferson, Nicholasville, Ky.

Paine, James D., No. 18 Buffalo street, Rochester, N. Y.

Paine, Milton K., cor. Main and State streets, Windsor, Vt.

Painter, Emlen, cor. Clay and Kearney streets, San Francisco, Cal.

Palmer, Hosea W., No. 125 State street, Chicago, Ill.

Palmer, John D., Monticello, Fla.

Panknin, Charles F., No. 123 Meeting street, Charleston, S. C.

Parcher, George A., Main street, Ellsworth, Me.

Parker, George H., Drapers' Block, Main street, Andover, Mass.

Parker, Joseph L., No. 232 Tremont street, Boston, Mass.

Parr, John C., Main street, Weston, Mo.

Parrish, Clemmons, No. 512 Parrish street, Philadelphia, Pa.

Parrish, Dillwyn, No. 1017 Cherry street, Philadelphia, Pa.

Parsons, John, No. 684 Wabash avenue, Chicago, Ill.

Parsons, Robert E., No. 19 Main street, Orange, N. J.

Partridge, Charles K., Granite Block, Augusta, Me.

Patch, Edgar L., No. 90 Green street, Boston, Mass.

Patten, I. Bartlett, No. 39 Harrison street, Boston, Mass.

Patten, John F., No. 1 Granite Block, East Market street, Bangor, Me.

Patterson, James L., cor. Twenty-first street and Ridge avenue, Philadelphia, Pa.

Patten, William A., Catlettsburg, Ky.

Pauly, Christian, cor. Pacific avenue and Myrtle street, Jersey City, N. J.

Peabody, William H., No. 8 South Division street, Buffalo, N. Y.

Peacock, Frederick S., No. 102 Whitehall street, Atlanta, Ga.

Peirpoint, Newton, Englewood, Cook County, Ill.

Peixotto, Moses L. M., No. 686 Sixth avenue, New York.

Pennington, T. H. Sands, No. 400 Broadway, Saratoga, N. Y.

Penrose, Stephen F., Quakertown, Pa.

Perkins, Benjamin A., Portland, Me.

Perkins, Elisha H., cor. Green and Baltimore streets, Baltimore, Md.

Perkins, William A., No. 213 Main street, Virginia City, Nev.

Perot, T. Morris, No. 1810 Pine street, Philadelphia, Pa.

Perry, Bayard T., No. 1089 Elm street, Manchester, N. H.

Perry, Frank V., No. 213 Main street, Danbury, Conn.

Peters, Alexander C., No. 252 Orange street, Newark, N. J.

Petrie, Alexander B., Corbett's Block, Wyndham street, Guelph, Ont., Can.

Pfeiffer, Adolph, cor. Sixth and Washington avenue, St. Louis, Mo.

Pfingst, Edward C., cor. Third and Breckenridge streets, Louisville, Ky.

Pfingst, Ferdinand J., cor. Twentieth and Market streets, Louisville, Ky.

Pfingst, Henry A., cor. Eleventh and Market streets, Louisville, Ky.

Pfingsten, Gustavus, No. 900 Second avenue, New York,

Phelps, Dwight, opposite Methodist Church, West Winstead, Conn.

Phillips, Walter F., Nos. 134, 136, and 138 Middle street, Portland, Me.

Phipps, John M., Day's Block, Main street, Monson, Mass.

Physick, Henry S., No. 810 Olive street, St. Louis, Mo.

Pickford, Thomas, Main street, Wallingford, Conn.

Pile, Wilson H., cor. Passyunk avenue and Catharine street, Philadelphia, Pa.

Pinkham, Alonzo T., Franklin Square, Dover, N. H.

Pinson, John L, Atlanta, Ga.

Pitt, John R, Jr., No. 218 Main street, Middletown, Conn.

Plaisted, James H., Main street, Waterville, Me.

Plummer, David G., No. 6 Main street, Bradford, Stark County, Ill.

Plummer, George B., Water street, Hinsdale, Mass.

Post, Elisha, cor. Main and Pine streets, Athens, N. Y.

Power, Frederick B., Strasburg, Germany.

Powell, Thomas W., No. 10 Houston street, Fort Worth, Texas.

Prentice, Frederick F., opposite Post-office, Janesville, Wis.

Prescott, Albert B., University of Michigan, Ann Arbor, Mich.

Prescott, Horace A., Dorchester, Mass.

Preston, Alfred, Jr., cor. Franklin and Congress streets, Portland, Me.

Preston, David, cor. Ninth and Lombard streets, Philadelphia, Pa.

Price, Charles S., cor. Fourteenth and F streets, Washington, D. C.

Primm, Hubert, S. E. cor. Fourteenth street and Washington avenue, St. Louis, Mo.

Procter, Wallace, cor. Ninth and Lombard streets, Philadelphia, Pa.

Proctor, Benjamin, No. 6 Healey's Arcade, Lynn, Mass.

Pugh, Finley B., Main street, Rushville, Ind.

Punch, William F., Mobile, Ala.

Purcell, John B., No. 1216 East Main street, Richmond, Va.

Pyle, Cyrus, No. 326 Fulton street, Brooklyn, N. Y.

Raas, Francis, Union and Hoyt streets, Brooklyn, N. Y.

Rackley, Benjamin F., Franklin Square and Charles street, Dover, N. H.

Ramsperger, Gustavus, No. 703 Fulton street, Brooklyn, N. Y.

Randall, George D., Railroad street, St. Johnsbury, Vt.

Rankin, Charles F., No. 123 Meeting street, Charleston, S. C.

Rankin, Jesse W., Decatur and Pryor streets, Atlanta, Ga.

Rano, Charles O., No. 1872 Niagara street, Buffalo, N. Y.

Rapelye, Charles A., No. 605 Main street, Hartford, Conn.

Raser, John B., No. 164 North Eighth street, Reading, Pa.

Redfearn, John, No. 200 North Main street, Fall River, Mass.

Reichardt, F. Alfred, No. 404 Fourth avenue, New York.

Reinhold, William, No. 146 North Clark street, Chicago, Ill.

Reinlein, Paul, Washington, D. C.

Remington, Joseph P., cor. Thirteenth and Walnut streets, Philadelphia, Pa

Rendings, Charles P., cor. Spring and Abigail streets, Cincinnati, O.

Renouff, James T., Main street, Winstead, Conn.

Restieaux. Thomas, No. 29 Tremont street, Boston, Mass.

Reum, Hermann F., cor. Fifth and Broadway, Cincinnati, O.

Reynolds, Howard P., cor. Front and Cherry streets, Plainfield, N. J.

Reynolds, John J., No. 2 Marietta street, Atlanta, Ga.

Reynolds, William K., No 354 Friendship street, Providence, R. I.

Rhoades, Stephen H., No. 88 Main street, Pittston, Pa.

Rice, Charles, Bellevue Hospital, New York.

Rice, J. Allen, No. 116 Main street, Milford, Mass.

Richardson, J. Clifford, No. 704 North Main street, St. Louis, Mo.

Richardson, James H., No. 52 Lake street, Chicago, Ill.

Richardson, Marius D., cor. Mill and Short streets, Lexington, Ky.

Ricker, George D., No. 178 Salem street, Boston, Mass.

Ricksecker, Theodore, No. 146 William street, New York.

Rickey, Randal, No. 157 North Green street, Trenton, N. J.

Rideout, James W., No. 171 Smith street, Brooklyn, N. Y.

Riley, Charles W., No. 1115 Race street, Philadelphia, Pa.

Ritson, Alfred, No. 94 South High street, Columbus, O.

Rittenhouse, Henry N., No. 218 North Twenty-second street, Philadelphia, Pa.

Robbins, Alonzo, cor. Eleventh and Vine streets, Philadelphia, Pa.

Robbins, Charles A., No. 91 Fulton street, New York.

Robbins, Daniel C., No. 91 Fulton ton street, New York.

Roberts, Joseph, cor. Harford and Greenmount avenue, Baltimore, Md.

Robinson, James S., cor. Second and Madison streets, Memphis, Tenn.

Robinson, William S., Yorkville, Toronto, Can.

Roche, Edward M., No. 611 South Fifteenth street, Philadelphia, Pa.

Roche, William F., cor Twentieth and South streets, Philadelphia, Pa.

Rogers, Wiley, cor. Fifteenth and Chestnut streets, Louisville, Ky.

Rogers, William H., North street, Middletown, N. Y.

Rohrbach, Theodore, Fort George, Florida.

Rollins, John F., Fort George, Fla.

Ronnefeld, Theodore, No. 195 Gratiot street, Detroit, Mich.

Rose, Henry J., cor. Yonge and Queen streets, Toronto, Ont., Can.

Rosengarten, Mitchell G., cor. Seventeenth and Fitzwater streets, Philadelphia, Pa.

Ross, George, Lebanon, Pa

Royce, Lucien M., No. 91 Fulton street, New York.

Ruete, Theodore W., No. 379 Main street, Dubuque, Iowa.

Rumsey, Samuel L., cor. Main street and Arlington avenue, East Orange, N. J.

Runyon, Edward W., care of Hostetter & Smith, San Francisco, Cal.

Russell, E. Walter, cor. Baltimore and Eutaw streets, Baltimore, Md.

Russell, Elias S., No. 69 Main street, Nashua, N. H.

Russell, Eugene J., cor. Army street and Canton avenue, Baltimore, Md.

Rust, William, No. 7 Peace street, New Brunswick, N. J.

Sackett, Samuel M., No. 29 Front street, Monroe, Mich.
Safford, William B., cor. Vance and Hernando streets, Memphis, Tenn.
Sander, Enno, cor. Nineteenth and S. Eleventh streets, St. Louis, Mo.
Sands, George G., No. 755 Sixth avenue, New York.
Sappington, Richard, No. 131 North Gay street, Baltimore, Md.
Sargent, Ezekiel H., No. 125 State street, Chicago, Ill.
Saunders, Richard B., Chapel Hill, N. C.
Saunders, William, London, Ont., Can.
Sayre, Edward A., No. 461 Myrtle avenue, Brooklyn, N. Y.
Sayre, William H., cor. Warner and Orange streets, Newark, N. J.
Scala, William Franklin, Washington, D. C.
Scattergood, George J , No. 413 Spruce street, Philadelphia, Pa.
Schaaf, Justice H., P. O. Lock Box 44, Vidalia, La.
Schaefer, George H., No. 129 Front street, Fort Madison, Iowa.
Schaffle, Samuel W. W., Market street, Lewisburg, Pa.
Schafhirt, Adolph J., cor. First and H streets, Washington, D. C.
Scheffer, Emil, No. 145 Market street, Louisville, Ky.
Scheffer, Henry W., No. 209 Myrtle street, St. Louis, Mo.
Scherff, John P., Glenwood avenue and Washington street, Bloomfield, N. J.
Schley, Steiner, Frederick City, Md.
Scholz, Philip, No. 3627 Broadway, St. Louis, Mo.
Schrader, Henry, No. 74 East Washington street, Indianapolis, Ind.
Schranck Henry C., Nos. 437 and 439 East Water street, Milwaukee, Wis.
Schreiber, August, Odd Fellows' Hall, Eighth street, Tell City, Ind.
Schroder, Hermann, No. 525 Main street, Quincy, Ill.
Schumann, P. J., Whitehall street, Atlanta, Ga.
Schumann, Theodore, cor. Whitehall and Hunter streets, Atlanta, Ga.
Schwab, Louis, Spring Grove avenue and Cooper street, Cincinnati, O.
Scofield, James S., No. 122 Bleecker street, New York.
Scott, Albert A., No. 2422 Broad street, Richmond, Va.
Scott, Nelson R., cor. Main and Southridge streets, Worcester, Mass
Scott, William H., No. 1617 Seventeenth street, Richmond, Va.
Scott, William J., No. 257 Prospect street, Cleveland, O.
Scribner, Benjamin F., cor. Main and State streets, New Albany, Ind.
Seabury, George J., No. 30 Platt street, New York.
Sears, George T., No. 50 Washington street, Boston, Mass.
Seward, Daniel W., No. 1230 Third avenue. New York.
Sechler, James C., No. 201 Mill street, Danville, Pa.
Selfridge, Matthew M., No. 709 Marshall street, Philadelphia, Pa.
Senier, Frederick S., No. 1122 Humboldt avenue, Milwaukee, Wis.
Sennewald, Ferdinand W., No. 800 Hickory street, St. Louis, Mo.
Sevin, N. Douglass, No. 141 Main street, Norwich, Conn.
Sewall, David J., Dorchester avenue and Adams street, Boston, Mass.
Sharp, Alpheus P., cor. Pratt and Howard streets, Baltimore, Md.
Sharp, J. Perin, Wabash avenue and Twenty-second street, Chicago, Ill.
Sharples, Stephen P., No. 114 State street, Boston, Mass.
Shaw, Louis, cor. Fifteenth and Market streets, Philadelphia, Pa.
Shaw, Robert J., Plainfield, N. J.
Shaw, Stephen F., Worcester, Mass.

Shead, Edward E., No. 8 Water street, Eastport, Me.
Shedden, John W., No. 1275 Broadway, New York.
Sheils, George E., No. 896 Broadway, New York.
Sheppard, Samuel A. D., No. 1129 Washington street, Boston, Mass.
Sherman, Linus E., Ludlow, Vt.
Sherwood, Hezekiah S., No. 339 Main street, Poughkeepsie, N. Y.
Shinn, James T., cor.* Broad and Spruce streets, Philadelphia, Pa.
Shivers, Charles, cor. Seventh and Spruce streets, Philadelphia, Pa.
Shoemaker, Joseph L., cor. Sixth and Girard avenue, Philadelphia, Pa.
Shoemaker, Richard M., cor. Fourth and Race streets, Philadelphia, Pa.
Shriver, Henry, No. 53 Baltimore street, Cumberland, Md.
Shryer, Thomas W., No. 103 Baltimore street, Cumberland, Md.
Shryock, Allen, cor. Broad and Parrish streets, Philadelphia, Pa.
Shurtleff, Israel H., No. 39 Elm street, New Bedford, Mass.
Shuttleworth, Edward B., No. 230 Sherburne street, Toronto, Ont., Can
Simms, Giles G. C., No. 1344 New York avenue, Washington, D. C.
Simpson, William, No. 33 Fayetteville street, Raleigh, N. C.
Simpson, William, San Francisco, Cal.
Simson, Francis C., No. 360 Washington street, Boston, Mass.
Simpers, J. Wilmer, cor. Thirteenth street and Columbia avenue, Philadelphia, Pa.
Singer, Peter J., Nos. 218, 220 and 222 Water street, Peoria, Ill.
Sitton, Charles E., No. 111 First street, Portland, Oregon.
Skelly, James T., No. 339 East Fourth street, New York.
Sliter, Albert H., cor. Fifth and Congress streets, Troy, N. Y.
Sloan, George W., Nos. 7 and 9 East Washington street, Indianapolis, Ind.
Smalley, Elijah, No. 271 Harrison avenue, Boston, Mass.
Smith, Albert E., No. 36 Tremont street, Boston, Mass.
Smith, Charles B., No. 861 Broad street, Newark, N. J.
Smith, Charles G., No. 39 West Main street, Springfield, O.
Smith, Israel P., No. 324 Bank street, Newark, N. J.
Smith, Joseph S., Akron, O.
Smith, Linton, cor. Seventh and Market streets, Wilmington, Del.
Smith, Thomas C., Charlotte, N. C.
Snow, Charles W., No. 28 East Genesee street, Syracuse, N. Y.
Snow, Jesse W., No. 23 Charles street, Boston, Mass.
Snowdon, George M., cor. Fourth and Noble streets, Philadelphia, Pa.
Snyder, Alva L., No. 33 Court Square, Bryan, Ohio.
Snyder, Ambrose C., cor. Court and Atlantic avenue, Brooklyn, N. Y.
Somers, Frank G., No. 333 Woodward avenue, Detroit, Mich.
Sommers, Richard M., No. 514 Birkley street, Camden, N. J.
Spalding, Warren A., No. 19 Church street, New Haven, Conn.
Spannagel, Charles C., No. 1607 Ridge avenue, Philadelphia, Pa.
Spenzer, Peter I., No. 88 Garden street, Cleveland, O.
Squibb, Edward R., No. 56 Doughty street, Brooklyn, N. Y.
Squires, C. P., Nos. 112, 114, and 116 Jefferson street, Burlington, Iowa.
Stacy, Benjamin F., No. 51 Vine street, Charlestown, Mass.
Stackpole, Harry H., No. 105 Cambridge street, East Cambridge, Mass.
Stamford, William H., No. 256 Mulberry street, Newark, N. J.
Stanford, James W., Cuthbert, Ga.
Stanley, Frederick P., Atlanta, Ga.

Starr, Thomas, cor. Ninth avenue and Twenty-eighth street, New York.

Steele, Henry, San Francisco, Cal.

Steele, James G., No. 316 Kearney street, San Francisco, Cal.

Stein, Jacob H , No. 803 Penn street, Reading, Pa.

Stoddard, George H., No. 43 Temple Place, Boston, Mass.

Stout, William A., No. 30 North Market street, Springfield, O.

Stowell, Daniel, No. 1045 Washington street, Boston, Mass.

Strassel, William, cor. Shelby and Broadway, Louisville, Ky.

Strehl, Louis C., Chicago, Ill.

Strother, William A., No. 126 Main street, Lynchburg, Va.

Sutton, Peter P., cor. Floyd and Market streets, Louisville, Ky.

Sweeney, Robert O , West Third street, St. Paul, Min.

Sweet, Henry, cor. Kinsie and Desplaines streets, Chicago, Ill.

Taber, Edward M., No. 2142 Pennsylvania avenue, Washington, D. C.

Talbot, James S., P. O. Box 274, Boston, Mass.

Taliaferro, E. C., cor. Fourth and Franklin streets, Richmond, Va.

Tarrant, Homer P., No. 212 Broad street, Augusta, Ga.

Tartis, Alfred J., No. 62 Broadway, Brooklyn, N. Y.

Taylor, Alfred B., 19 South Eleventh street, Philadelphia, Pa.

Taylor, Henry B., No. 1306 Girard avenue, Philadelphia, Pa.

Taylor, James H., No. 104 Thames street, Newport, R. I.

Taylor, John P., No 99 Third street, New Bedford, Mass.

Taylor, Walter A., No. 9 Peachtree street, Atlanta, Ga.

Test, Alfred W., cor. Second and Federal streets, Camden, N. J.

Thatcher, Joseph H., No. 12 Market street, Portsmouth, N. H.

Thatcher, Hervey D., No. 12 Market Square, Potsdam, N. Y.

Thayer, Henry, No. 150 Broadway, Cambridgeport, Mass.

Thibodeaux, Joseph G., Main street, Thibodeaux, La.

Thienemann, Charles, cor. Gay and Eden streets, Baltimore, Md.

Thomas, James, Jr., opposite Maxwell House, Nashville, Tenn.

Thompson, Thomas C., care of Finlay & Thompson, New Orleans, La.

Thompson, William B., No. 1700 Mount Vernon street, Philadelphia, Pa.

Thompson, William P., No. 5 West Baltimore street, Baltimore, Md.

Thompson, William S., No. 705 Fifteenth street, Washington, D. C.

Thompson, William S., No. 5 West Baltimore street, Baltimore, Md.

Thomsen, John J., Nos. 14 and 16 German street, Baltimore, Md.

Tibbs, William H., No. 235 Main street, Buffalo, N. Y.

Tilden, Henry A., New Lebanon, N. Y.

Tilyard, Charles S , cor Green and Franklin streets, Baltimore, Md.

Tomfohrde, John W., St. Louis, Mo.

Tompkins, Orlando, Boston Theatre, Boston, Mass.

Topley, James, Vallejo, Solano County, Cal.

Toplis, Robert J., Getty Square, Yonkers, N. Y.

Torrey, Charles Edward, Syracuse, Onondaga County, N. Y.

Tower, Levi, Jr., No. 1681 Washington street, Boston, Mass.

Townley, William W., No. 765 Broad street, Newark, N. J.

Tozzer, Samuel C., No. 95 Broad street, Lynn, Mass.

Trask, Charles M , No. 21 Pleasant street, Boston, Mass.

Trimble, Henry, cor Fifth and Callowhill streets, Philadelphia, Pa.

Troth, Samuel F., No. 1019 Cherry street, Philadelphia, Pa.

Tscheppe, Adolph, No. 1010 Third avenue, New York, N. Y.

Turner, Thomas L., No. 390 Tremont street, Boston, Mass.

Turnley, Pryor L., Rome, Ga.

Tufts, Charles A., No. 25 Washington street, Dover, N. H.

Tyson, Samuel E., No 141 West street, Georgetown, D. C.

Ubert, Julius C., cor. Lee and Division streets, Brooklyn, N. Y.

Ude, George, No. 3610 North Tenth street, St. Louis, Mo.

Underhill, Charles F., No. 153 Church street, Norfolk, Va.

Underhill, George F., cor. Main and School streets, Concord, N. H.

Underwood, Charles G., cor. Lewis street and Maverick Square, Boston, Mass.

Vandegrift, John A., No. 69 High street, Burlington, N. J.

Vandervoord, Ransford W., No. 482 Broad street, Newark, N. J.

Van Gieson, Theron W., No. 397 Broad street, Newark, N. J.

Van Patten, William J., College street, Burlington, Vt.

Van Winkle, Abraham, W., No. 35 Clinton avenue, Newark, N. J.

Vaupel, Charles P., No. 261 Superior street, Cleveland, O.

Vernor, James, No. 235 Woodward avenue, Detroit, Mich.

Viallon, Paul L., Bayou Goula, La.

Vickery, William H., S. W. cor. Central and Orchard streets, Dover, N. H.

Vincent, William, No. 117 Broadway, Brooklyn, N. Y.

Voelcker, Rudolph, Galveston, Tex.

Vogelbach, Herman A., Philadelphia, Pa.

Vogeler, Adolf G, No. 56 West Randolph street, Chicago, Ill.

Voorhees, William H., No. 21 Front street, Plainfield, N. J.

Vordick, August H., S. E. cor. Jefferson avenue and Benton street, St. Louis, Mo.

Wagener, Samuel H., No. 309 First street, San Jose, Cal.

Wagner, Henry, cor. Fourth and Elm streets, Cincinnati, O.

Wakefield, Seth D., No. 72 Lisbon street, Lewiston, Me.

Walker, F. W., Jr., New Brighton, Pa.

Walker, John A., Scott's Block, Argyle street, Caledonia, Ontario, Can.

Wanier, George S., No. 407 Eighth avenue, New York.

Wardell, Robert C, Battle Creek, Mich.

Warner, William R., No. 1228 Market street, Philadelphia, Pa.

Warren, George W., Washington opposite Rockland street, Boston, Mass.

Warrington, Charles W., cor. Fifth and Callowhill streets, Philadelphia, Pa.

Waugh, George J., Stratford, Ontario, Can.

Wayne, Edward S., No. 146 Broadway, Cincinnati, O.

Weaver, J. Thornton, No. 1341 Ridge avenue, Philadelphia, Pa

Weaver, James, No. 1275 Broadway, New York.

Weaver, John A, No. 210 Madison avenue, Easton, Pa.

Webb, John A., No. 210 Madison avenue, Baltimore, Md.

Webb, William H, No. 633 North Sixteenth street, Philadelphia, Pa.

Webber, Joseph T., cor. Main and State streets, Springfield, Mass.

Weber, William, cor. Fifteenth and Thompson streets, Philadelphia, Pa.

Webster, Stephen, No. 63 Warren avenue, Boston, Mass.

Weidemann, Charles A., No. 563 North Twenty-second street, Philadelphia, Pa.

Weinman, Oscar C., No. 173 Seventh avenue, New York.

Weismann, Augustus W., No. 257 Broom street, New York.

Welch, Leonard E., Albany, Ga.

Wellcome, Henry S., No. 91 Fulton street, New York.

Wells, Ebenezer M., Fort Worth, Texas.

Wells, Jacob D., cor. Fourteenth street and Central avenue, Cincinnati, O.

Wells, John C., cor. Allyn and High streets, Hartford, Conn.

Wells, Romanta, New Haven, Conn.

Wenck, George J., No. 381 Sixth avenue, New York.

Wendel, Henry E., cor. Third and George streets, Philadelphia, Pa.

Wendler, Robert, No. 414 Atlantic avenue, Brooklyn, N. Y.

Wenzel, William T., cor. Fourth and Howard streets, San Francisco, Cal.

Westerfield, Joseph H., No. 170 William street, New York.

Whall, Joseph S., No. 82 Hancock street, Quincy, Mass.

Wharton, John C., No. 38 Union street, Nashville, Tenn.

Wharton, William H., No. 38 Union street, Nashville, Tenn.

Wheeler, C. Gilbert, University of Chicago, Chicago, Ill.

Wheeler, Lucian F., Waldo, Fla.

White, Aaron S., No. 59 High street, Mt. Holly, N. J.

White, Philip A., No. 102 Gold street, New York.

Whitfield, Thomas, No. 240 Wabash Avenue, Chicago, Ill.

Whiting, Frederick T., Main street, Great Barrington, Mass.

Whitman, Nelson S., No. 3 Merchants' Exchange, Nashua, N. H.

Whitney, Henry M., cor. Essex and Lawrence street, Lawrence, Mass.

Wickham, William H., No. 91 Fulton street, New York.

Wiegand, Thomas S., No. 528 Arch street, Philadelphia, Pa.

Wienges, Conrad, cor. Coles and Fourth streets, Jersey City, N. J.

Wigert, Carl R., No. 213 Jefferson street, Burlington, Iowa.

Wike, Albert D., No. 8 Market street, Marietta, Pa.

Wilcox, Frederick, Waterbury, Conn.

Wild, Joseph O., Holyoke, Mass.

Wilder, Graham, No. 181 Main street, Louisville, Ky.

Wilder, Hans M., 209 East Twenty-third street, New York.

Wilkens, Daniel G., No. 11 Charles street, Boston, Mass.

Willard, William H., No. 3 Mill street, Worcester, Mass.

Williams, John K., No. 391 Main street, Hartford, Conn.

Williams, Joseph, No. 141 Dundas street, London, Ont., Can.

Williamson, E. J., Ninth and Franklin streets, St. Louis, Mo.

Willis, Joseph N., No. 327 East Franklin street, Richmond, Va.

Wilson, Adam H., cor. Dauphin and Cedar streets, Philadelphia, Pa.

Wilson, Benjamin O., No. 18 and 20 Central street, Boston, Mass.

Wilson, Julius H., No. 189 Maxville street, Chicago, Ill.

Wilson, William, New York.

Wingate, Jeremiah Y., No. 11 Central Building, Somersworth, N. H.

Winkleman, John H., cor. Liberty and German streets, Baltimore, Md.

Winslow, Samuel W., No. 33 Kingston street, Boston, Mass.

Winter, Jonas, No. 81 West Franklin street, Hagerstown, Md.

Witte, Edward, No. 4128 Broadway, St. Louis, Mo.

Wolfe, Nathaniel, Wilkesbarre, Pa.

Woltersdorf, Louis, No. 171 Blue Island avenue, Chicago, Ill.

Wood, Alonzo F., No. 2 Church street, New Haven, Conn.

Woodbridge, George W., No. 2 Faneuil Hall Square, Boston, Mass.

Woodruff, Roderick S., No. 91 Bank street, Waterbury, Conn.

Woodward, Samuel M., No. 91 North Charles street, Baltimore, Md.

Worthington, J. Willits, Main street, Moorestown, N. J.

Wright, Archibald W., cor. Front and Market streets, Philadelphia, Pa.

Wright, William P., No. 33 Kingston street, Boston, Mass.

Wynn, William, No. 496 Fulton street, Brooklyn, N. Y.

Yeomans, Lewis W., No. 268 Front street, Belleville, Ont., Can.

Yonge, St. John R., Savannah, Ga.

Yorston, Matthew M., No. 429 Central avenue, Cincinnati, O.

Young, Alexander T., No. 103 Sixteenth street, Wheeling, W. Va.

Young, John E., No. 3 Sherman's Block, Vergennes, Vt.

Zeilin, John H., No. 512 Cherry street, Philadelphia, Pa.

Zellhœfer, George, No. 91 Fulton street, New York.

Ziegler, Philip M., No. 526 Penn street, Reading, Pa.

Zoeller, E. V., Tarboro, N. C.

Zwick, George G., cor. Eleventh and Meridian streets, Covington, Ky.

LIST OF DECEASED MEMBERS.

HONORARY MEMBERS.

		Elected.	Died.
Bache, Franklin, M.D.,	Philadelphia, Pa.,	1857	1864
Bailey, Montgomery J., M.D.,	New York,	1856	1873
Boullay, Pierre, François Guillaume,	Paris, France,	1868	1869
Casselmann, Arthur, Ph.D.,	St. Petersburg, Russia,	1868	1872
Deane, Henry,	London, England,	1868	1874
Durand, Elias,	Philadelphia, Pa.,	1857	1873
Farrington, Thomas,	Boston, Mass.,	1856	1867
Hanbury, Daniel,	London, England,	1868	1875
Ludwig, Hermann, Ph.D.,	Jena, Germany,	1871	1873
Robinet, Stephane,	Paris, France,	1868	1869
Wood, George B., M.D.,	Philadelphia, Pa.,	1857	1879

ACTIVE MEMBERS.

		Elected.	Died.
Aimar, George Washington,	Charleston, S. C.,	1874	1877
Anderson, James H.,	New York,	1859	1866
Andrews, George W. (Pres. 1856–57),	Baltimore, Md.,	1856	1877
Aspinwall, James S.,	New York,	1855	1874
Atwood, Charles Henry,	Boston, Mass.,	1856	1877
Bache, Charles L.,	San Francisco, Cal.,	1852	1854
Backus, James W.,	Marine City, Mich.,	1867	1870
Badger, Charles William,	Newark, N. J.,	1870	1877
Balmer, James,	Baltimore, Md.,	1856	1866
Barry, John W.,	Baltimore, Md.,	1856	1861
Baylis, William E. P.,	Brooklyn, N. Y.,	1860	1872
Baynon, John,	Shreveport, La.,	1858	1862
Benzinger, John Sylvester,	Baltimore, Md.,	1860	1869
Bertolett, William J.,	Shreve, O.,	1872	1877
Bidwell, Marshall Spring,	Elmira, N. Y.,	1871	1877
Bigelow, Francis O.,	Medford, Mass.,	1859	1863
Billings, Samuel J.,	New York,	1860	1865
Bingham, John C.,	St. Johnsbury, Vt.,	1853	1870
Blair, Henry C.,	Philadelphia, Pa.	1855	1862
Blauw, Hippolyt A.,	Rochester, N. Y.,	1856	1870

		Elected.	Died.
Bowman, Henry K.,	Philadelphia, Pa.,	1869	1873
Boyden, Ashel,	Boston, Mass.,	1853	1877
Bright, James Evesson,	Worcester, Mass.,	1868	1872
Bringhurst, Ferris,	Wilmington, Del.,	1862	1871
Brown, John T.,	Boston, Mass.,	1859	1860
Brown, William,	Boston, Mass.,	1858	1875
Canavan, Benjamin,	New York, N. Y.,	1855	1857
Carney, Charles Tibbetts,	Boston, Mass.,	1853	1862
Caspari, Charles,	Baltimore, Md.,	1856	1870
Chapman, William B. (Pres. 1854–55),	Cincinnati, O.,	1852	1874
Churchill, George W.,	Chelsea, Mass.,	1865	1869
Clency, William F.,	Cincinnati, O.,	1859	1865
Coddington, Isaac,	New York, N. Y.,	1855	1874
Colby, Moses D.,	Boston, Mass.,	1859	1870
Coon, Walter S.,	New York, N. Y.,	1858	1861
Coppuck, Peter V.,	Mount Holly, N. J.,	1857	1869
Cressman, Noah,	Waterloo, Canada West,	1863	1864
Cunningham, James E.,	Pittsburg, Pa.,	1860	1863
Cushman, Alexander,	New York, N. Y.,	1858	1861
Daggett, Alfred, Jr.,	New Haven, Conn.,	1865	1878
Davies, Robert J.,	Brooklyn, N. Y.,	1858	1872
De Motte, Henry A.,	Jersey City, N. J.,	1871	1873
D'Evers, Henry Gaston,	Chicago, Ill.,	1865	1870
Dodge, John P.,	New York, N. Y.,	1855	1863
Easterbrook, Ray B.,	New York, N. Y.,	1858	1868
Ellis, Charles (Pres. 1857–58),	Philadelphia, Pa.,	1852	1873
Emanuel, Louis M.,	Linwood, Pa.,	1857	1868
Everson, John C.,	Philadelphia, Pa.,	1863	1872
Eyster, Christopher Edward,	Yankton, Dak.,	1871	1877
Fish, George B.,	Saratoga Springs, N. Y.,	1860	1866
Fish, Henry F.,	New York, N. Y.,	1852	1868
Foley, J. T.,	Houston, Tex.,	1878	1879
Folger, William Swain,	Boston, Mass.,	1875	1878
Forester, Richard,	Brooklyn, N. Y.,	1860	1862
Frohwein, Max,	New York, N. Y.,	1865	1877
Fulton, John Culpepper P.,	Brooklyn, N. Y.,	1873	1874
Gabaudan, Arthur W.,	New York, N. Y.,	1862	1870
Gaither, Francis S.,	Washington, D. C.,	1860	1876
Gay, William,	Cambridgeport, Mass.,	1858	1862
Geiger, Conrad J.,	Canton, O.,	1866	1876
Gerhard, John C.,	Cincinnati, O.,	1862	1866
Geyer, Andrew,	Boston, Mass.,	1853	1855
Goodwin, William W.,	Newburyport, Mass.,	1853	1877
Graefle, Frederick Alexander,	Baltimore, Md.,	1870	1873
Groneweg, Louis,	Cincinnati, O.,	1864	1866
Harbaugh, Valentine,	Washington, D. C.,	1856	1871
Hassard, Peter J.,	Philadelphia, Pa.,	1853	1876

		Elected.	Died.
Hegeman, Frederick Augustus,	New York, N. Y.,	1855	1860
Hegeman, William,	New York, N. Y.,	1858	1875
Henchman, Daniel,	Boston, Mass.,	1853	1878
Hensch, Hugo,	Cleveland, O.,	1872	1873
Hendel, Samuel D.,	St. Louis,	1858	1871
Hill, Henry E.,	Detroit, Mich.,	1866	1868
Hollis, Thomas,	Boston, Mass.,	1853	1875
Hommann, James W.,	New York, N. Y.,	1875	1875
Howard, George M.,	Washington, D. C.,	1871	1877
Hughes, Henry Arnold,	Louisville, Ky.,	1857	1876
Hunt, Henry H.,	Balston Spa, N. Y.,	1876	1877
Jardella, Jerome B.,	Vincennes, Ind.,	1865	1870
Jenkins, William Ellis,	Boston, Mass.,	1865	1869
John, Frederick L.,	Philadelphia, Pa.,	1856	1864
Johnston, Charles P.,	Memphis, Tenn.,	1868	1873
Junghanns, Charles A.,	Cincinnati, O.,	1858	1862
Keffer, Frederick A.,	New Orleans, La.,	1862	1873
Kennedy, Robert C.,	Cleveland, O.,	1865	1868
Kent, Ashbury,	Cincinnati, O.,	1854	1860
Kent, William,	Cincinnati, O.,	1864	1867
Kidder, Darius B.,	Boston, Mass.,	1858	1874
King, Alexander,	Buffalo, N. Y.,	1874	1876
King, Henry,	New York, N. Y.,	1858	1867
Knapp, Edwin E.,	Norwalk, Conn.,	1860	1862
Kolp, Chistopher Henry,	Philadelphia, Pa.,	1876	1878
Krummeck, Jacob,	Santa Fé, New Mex.,	1867	1878
Laidley, Joseph,	Richmond, Va.,	1852	1861
Lancaster, Thomas A.,	Philadelphia, Pa.,	1859	1875
Lane, James B.,	Fitchburg, Mass.,	1856	1867
Leitch, Alexander,	St. Louis, Mo.,	1858	1868
Lineaweaver, Kline Cyrus,	Washington, D. C.,	1864	1873
Little, William B.,	Panama, U. S. Colombia,	1857	1867
Longshaw, William, Jr.,	Bayou Sara, La.,	1858	1864
Lyman, Benjamin,	Montreal, Can.,	1875	1878
Lyon, Charles H, Jr.,	Boston, Mass.,	1858	1871
McBride, James,	St. Louis, Mo.,	1864	1871
McConville, Michael S.,	Worcester, Mass.,	1859	1873
McDonald, John,	Brooklyn, N. Y.,	1860	1861
McIntyre, Timothy C.,	Washington, D. C.,	1858	1862
McPherson, George B.,	Cincinnati, O.,	1867	1871
Mallinckrodt, Gustavus,	St. Louis, Mo.,	1869	1877
Massot, Eugene L.,	St. Louis, Mo.,	1857	1871
Matt, Joseph,	Columbus, O.,	1872	1874
Mattern, Jonathan C.,	Pittsburg, Pa.,	1860	1876
Maxwell, James T.,	New York, N. Y.,	1855	1860
Mayer, Ferdinand F.,	New York, N. Y.,	1859	1869
Meakim, John (Pres. 1855–56),	New York, N. Y.,	1852	1863
Melzar, Augustus P.	Wakefield, Mass.,	1856	1874

		Elected.	Died.
Metcalf, Tristram W.,	Brooklyn, N. Y.,	1857	1873
Milhau, John (Pres. 1867–68),	New York, N. Y.,	1855	1874
Muller, William H.,	Chicago, Ill.,	1865	1870
Nagle, John G.,	Baltimore, Md.,	1863	1869
Nairn, Joseph Wilson,	Washington, D. C.,	1858	1875
Nadand, James W.,	Cincinnati, O.,	1864	1868
Norgrave, Samuel K.,	Pittsburg, Pa.,	1857	1871
Oliffe, William J.,	New York, N. Y ,	1858	1866
O'Brien, Joseph C.,	Baltimore, Md.,	1863	1873
Osgood, Samuel W.,	Davenport, Iowa,	1858	1860
Palmer, Albert G.,	Washington, D. C ,	1858	1860
Parker, Herschel,	Brooklyn, N. Y.,	1867	1870
Parrish, Edward (Pres. 1868–69),	Philadelphia, Pa.,	1852	1872
Peck, Samuel P.,	Bennington, Vt.,	1853	1859
Pettis, Newton C.,	North Adams, Mass.,	1868	1874
Philbrick, Samuel R.,	Boston, Mass.,	1852	1859
Phillips, Lewellyn,	Baltimore, Md.,	1856	1865
Platzer, Robert,	Philadelphia, Pa.,	1865	1874
Polhemus, James L.,	Sacramento, Cal.,	1866	1867
Pollard, Charles P.,	Marysville, Cal.,	1859	1869
Porter, Henry C.,	Towanda, Pa.,	1869	1877
Procter, William, Jr. (Pres. 1862–63),	Philadelphia, Pa.,	1852	1874
Pyle, J. Lindley,	Brooklyn, N. Y.,	1859	1866
Rehfuss, Lewis,	Cincinnati, O.,	1854	1856
Reifsnider, William E.,	Baltimore, Md.,	1864	1872
Reinold, Bernard H.,	New York, N. Y.,	1861	1876
Roberts, David,	Boston, Mass.,	1858	1863
Rollmann, Frederick,	Philadelphia, Pa.,	1862	1864
Roemer, Daniel,	Cincinnati, O.,	1865	1870
Sands, Jesse M.,	New York, N. Y.,	1860	1867
Schmidt, Henry,	New York, N. Y ,	1874	1875
Schmidt, William George,	Louisville, Ky.,	1874	1877
Scott, David,	Worcester, Mass.,	1855	1878
Scott, John,	Cincinnati, O.,	1854	1873
Scully, Harmar D.,	Pittsburg, Pa.,	1858	1866
Smith, Charles Augustus,	Cincinnati, O.,	1852	1862
Smith, Edward A.,	Baltimore, Md.,	1870	1875
Smith, Edwin R.,	Monmouth, Ill.,	1862	1869
Smith, James W.,	Norfolk, Va.,	1873	1876
Smith, Samuel A.,	Newburyport, Mass.,	1859	1874
Squire, William H.,	Germantown, Pa.,	1862	1865
Stabler, Richard H. (Pres. 1870–71),	Alexandria, Va.,	1856	1878
Steiner, Henry,	Philadelphia, Pa.,	1857	1858
Stephens, William G.,	Yonkers, N. Y.,	1860	1878
Stevens, Ashbel Mead,	Cincinnati, O.,	1854	1860
Stevens, Rufus Walker,	Somersworth, N. H.,	1859	1868
Suding, Henry A.,	Baltimore, Md.,	1870	1875

		Elected.	Died.
Sweetser, Thomas Augustus,	South Danvers, Mass.,	1859	1860
Taylor, Robert James,	Newport, R. I.,	1859	1871
Taylor, William,	Philadelphia, Pa.,	1868	1871
Thomas, William,	Jersey City, N. J.,	1855	1856
Tully, Andrew J.,	New York, N. Y.,	1862	1875
Uhl, Charles,	Memphis, Tenn.,	1860	1873
Waite, Samuel B ,	Washington, D. C.,	1858	1862
Warren, Charles Henry,	Brandon, Vt.,	1872	1876
Warren, William,	Brighton, Mass.,	1867	1871
Watson, William J.,	Brooklyn, N. Y ,	1853	1872
Weyman, George W.,	Pittsburg, Pa.,	1858	1864
White, Daniel F.,	Charlestown, Mass ,	1859	1864
White, William P.,	Chicago, Ill.,	1865	1866
Whitehead, Silas,	Lynchburg, Va.,	1856	1858
Willard, Joseph,	Chicago, Ill.,	1865	1878
Wilson, George C.,	Boston, Mass.,	1859	1861
Wiseman, Charles,	Baltimore, Md.,	1856	1862
Witzell, Louis,	Cincinnati, O.,	1864	1867
Wood, G. Davidge,	Baltimore, Md.,	1856	1863
Woods, Samuel H.,	Boston, Mass.,	1859	1869
Wright, George,	New York, N. Y.,	1869	1873

LIST OF RESIGNATIONS.

Names.	Residence.	Elected.
†Carey, Edward F.,	Providence, R. I.,	1875
†Collins, Charles F. G.,	Beloit, Wis.,	1859
‡Craighill, Edward A ,	Lynchburg, Va.,	1876
‖Davis, George W.,	Providence, R. I.,	1875
‖Fish, George H.,	Saratoga, N. Y.,	1869
§Foster, Henry B.,	Concord, N. H.,	1874
§Mitchell, Bossom A.,	London, Ont.,	1877
‡Morse, Franklin A.,	West Rutland, Vt.,	1876
§Peduzzi, George S.,	Brooklyn, N. Y.,	1861
§Potts, Jesse N.,	Baltimore, Md.,	1870
‡Sutton, Edward S.,	Louisville, Ky.,	1871
§Tilge, Frederick, A.,	Philadelphia, Pa.,	1868
§Wells, Charles C.,	Northampton, Mass.,	1876

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† Left the business.

‡ Inability to attend meetings.

‖ Ill health.

§ No reason given.

LIST OF MEMBERS DROPPED FROM THE ROLL.

Name.	Residence.	Elected.
Blickhahn, George H.,	St. Louis, Mo.,	1871
Borcherdt, Julius C.,	Chicago, Ill.,	1867
Boyd, Abraham,	Columbus, O.,	1869
Brill, William H.,	Alleghany, Pa.,	1872
Burrow, John H.,	Norfolk, Va.,	1873
Chapman, Foster B.,	Unknown,	1875
Chapman, Samuel,	Unknown,	1857
Childs, Louis M.,	Greenfield, Mass.,	1875
Cook, John G.,	Lewiston, Me.,	1859
Conrad, William A. S.,	Richmond, Va.,	1873
Christy, Robert,	Mansfield, Pa.,	1871
Cunningham, John M.,	Pottstown, Pa.,	1867
Cusick, Robert,	Jersey City, N. J.,	1875
Daggett, Henry,	New Haven, Ct.,	1871
Davidson, Frank A.,	Boston, Mass.,	1873
Day, Charles H.,	Champaigne, Ill.,	1873
De la Cour, Joseph L.,	Camden, N. J.,	1870
Devendorf, Almond S.,	Galesburg, Ill.,	1872
Foertmyer, Adolphus G.,	Cincinnati, O.,	1864
Fratz, John G.,	Cincinnati, O.,	1864
Gallagher, James M.,	Washington, N. C.,	1875
Gates, Amasa O.,	Morrisville, Vt.,	1876
Geiger, Walter P.,	Canton, O.,	1867
Grant, William R.,	St. Louis, Mo.,	1871
Green, Alexander A.,	Aurora, Nev.,	1868
Guerdan, John,	St. Louis, Mo.,	1871
Hatfield, Vermont,	Middleton, O.,	1874
Havenstein, Alexander,	Newark, N. J.,	1870
Heyser, William, Jr.,	Chambersburg, Pa.,	1856
Hitchcock, William E.,	Newark, N. J.,	1875
Jameson, Thomas N.,	Chicago, Ill.,	1869
Karrman, William,	Cincinnati, O.,	1864
Lambe, John J.,	Hartford, Ct.,	1868
Lamberton, John F.,	Saratoga, N. Y.,	1872
Littell, William M.,	Newark, N. J.,	1870
Lunt, Samuel H.,	Alexandria, Va.,	1873
Lutz, Harrison S.,	Alleghany, Pa.,	1872
McDougall, James,	Port Jervis, N. Y.,	1874
Markward, James,	Cincinnati, O.,	1864
Mills, Andrew M.,	Newark, N. J.,	1872

Name.	Residence.	Elected.
Mobley, Cyrus S.,	Louisville, Ky.,	1874
Nodler, Peter,	Covington, Ky.,	1870
Orynski, Leonardo,	Hannibal, Mo.,	1871
Osborne, Hampden,	Columbus, Miss.,	1869
Ottinger, Franklin,	Unknown,	1871
Patterson, Theodore H.,	Chicago, Ill.,	1865
Phillips, George W. C.,	Jersey City, N. J.,	1871
Sherman, Oliver G.,	St. Louis, Mo.,	1859
Shoemaker, Benjamin,	Wilmington, Del.,	1867
Smith, Warren,	Chickopee, Mass.,	1874
Souder, Joseph A.,	Camden, N. J.,	1870
Steever, Henry C.,	Memphis, Tenn.,	1865
Street, Alexander G. T.,	Okawville, Ill.,	1874
Sylvester, Samuel Retallack,	Unknown,	1858
Taylor, William A. S.,	Norfolk, Va.,	1873
Wagner, Louis,	Richmond, Va.,	1873
Wangler, Conrad D.,	Cincinnati, O.,	1876
Webb, Henry E.,	West Farms, N. Y.,	1865
White, George H.,	Jersey City, N. J.,	1868
Wilder, Frederick W.,	Ware, Mass.,	1875
Wright, William, Jr.,	Fort Wayne, Ind.,	1859

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